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What Is the Relative Influence Of Teacher Educational Attainment On Student NJASK-4 Scores?

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Abstract

This study investigated the relationship between Teacher Educational Attainment and student achievement. An analysis using Multiple Regression of student scores from the 2003 administration of NJASK 4, with a sample size of 888 New Jersey public schools with over 72,000 students indicate when we controlled for student and school level variables, the percentage of teachers in a school with a master's degree was a significant predictor of student performance and had a positive relationship with student achievement. Both a master's degree and a doctorate degree served as proxy for Teacher Educational Attainment. Included in the findings is the powerful relationship between District Factoring Group and student performance, and student mobility and student performance.

WHAT IS THE RELATIVE INFLUENCE OF TEACHER EDUCATIONAL ATTAINMENT ON STUDENT NJASK 4 SCORES?

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DEDICATION

I dedicate the goal of graduating from Seton Hall University to my Savior Jesus Christ. I believe the experiences I had through the program is all part of your plan in providing me with the training and skill to become more effective in helping others, specifically, the apples of your eyes, children. I need you more and more everyday. *As the hart panteth after the water brooks, so panteth my soul after thee...* Psalms 41:1

I also dedicate the goal of graduating, to my wife Renee' Michel. Thank you for the many sacrifices you made for me during the past two years, being in a new house alone, having our son, and just simply bearing with me. I would not have been able to graduate without you having made them. To my daughter Kayla Michel, you are my inspiration; to my son Isaiah Michel, you are my strength. To my mother Anelle Michel, I just hope I can bring honor to your name; there are not enough words to express how much I love you. My brothers Jenner, Landy, Yvan, and Dick you guys bring the best out in me. My sisters Mylene and Natalie, thank you for thinking I am "all that;" I am trying to live up to the image. My nieces and nephews, Valencia, Stephanie, Marcus, Lucina, Poppy, and Baby Landy; I love you all.

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CHAPTER I

A good plan is like a road map: it shows the final destination and usually the best way to get there. - H. Stanley Judd

Introduction

Increasingly, the national debate between educators and researchers is which school variables most impact student achievement? Additionally, as politicians, particularly at the federal level, become more and more involved in the funding of public education, the issue of which variables (i.e, class size, curriculum, socioeconomic status, "teacher quality," and their relationship to student achievement) becomes progressively more important to identify. Coleman (1966) suggested, in a landmark study, that schools have little influence on student achievement, independent of students' backgrounds. In contrast, Ferguson (1991) reported in his paper that teacher qualification is the most important variable in student achievement.

By focusing on teachers, this study hopes to add critical information and produce reliable evidence to advance the debate,

which may help shape policy regarding public school education. Politicians, educators, and parents, who are all obvious stakeholders in public schools, are in the process of investigating ways toward the ultimate level playing field for all public school students (particularly for minorities, females, and those in urban and rural settings). In fact, a great number of different policy initiatives have been implemented in the areas that directly fund public schools. Some of the initiatives include, requiring specific courses of study for students, high-stakes testing, standard-based instruction, and changes in teacher education programs. While the initiatives involve different approaches and activities, all are centered on increasing student achievement. To that end, through the No Child Left Behind Act of 2001 (NCLB), the federal government has increased its role in influencing student achievement in education. "The No Child Left Behind Act of 2001 is a landmark in education reform, designed to improve *student achievement* and change the culture of America's schools." (U.S. Department of Education, 2001)

A primary goal of this study, since there are inconclusive results and few studies regarding the specific variable of teacher educational attainment and its influence on student achievement, is to add to the general body of literature as well as provide evidence of its influence on student achievement.

Today, student achievement is increasingly being defined through test scores. Many supporters of standardized tests purport test scores are the best indicator of student achievement, and these tests provide a numerical value that can be used to compare apples with apples thereby, removing subjectivity. It should be noted, however, many professionals in the educational field do not share this belief.

Notwithstanding, education reform is increasingly in the forefront of policy debate and politics. Various stakeholders (e.g., parents, teachers, educational leaders, policy developers, politicians, and students) continue to search for variables that most influence student performance. A number of past research studies reveal the impact of socioeconomic status, school size, class size, and other variables on student achievement.

However, in part due to recent research suggesting that teachers have more of an impact on student achievement than previous research has suggested (Darling-Hammond, (2000); Wenglinsky, (2002), a shift has occurred in education lately and much of the debate is now focusing on the accountability of teachers and on their ability to impact student achievement. As a result, the NCLB legislation mandates all teachers in core academic areas (e.g., Math, Science, and English) to meet the provisions of being "highly qualified" by the end of the 2005-2006

school year. Thus, all teachers in every state who are teaching a core academic area will have to be licensed by the state, hold at least a bachelor's degree, and demonstrate competence by passing a test, as determined by each state in their subject area.

Most people agree a teacher has significant impact on student achievement. In fact, many stakeholders support the logical premise that better prepared teachers produce better performing students, which results in higher student achievement. Conversely, less prepared teachers produce worse performing students, which results in lower student achievement. The quality of teachers is an important determinant of school quality but is difficult to measure. One indicator is the level of teachers' educational attainment. Based on National Center of Education Statistics (NCES) on Teacher Educational Background (2003), 41% of teachers in public schools hold a master's degree; teachers in the Northeast are more likely to hold master's degrees than their peers in other regions (New Jersey, the source of the database used for this study, is located in this region). Furthermore, NCES data indicated that nationally public schools with low minority enrollments (less than 10%) and schools with low percentages of students eligible for free or reduced-price lunch (less than 15%) both have higher percentages of teachers with master's degrees than those with high minority enrollments (50% or more) and high

percentages of students eligible for free or reduced-price lunch (30% or more).

Notwithstanding, research continues to indicate that what occurs in classrooms, the training and ability of the teaching staff, and the overall culture and atmosphere of the school, all affect student learning. Similar to recent studies using data from respective state departments of education, this study likewise used data provided by the Department of Education of New Jersey.

Given the fact that teachers are now the central focus of the federal policy, *No Child Left Behind*, which legislates that each state in the country have a "Highly Qualified" teacher in each of their public school classrooms. Many states are in the beginning stages of implementing policies similar to New York, Pennsylvania, and North Carolina that already have codes in their respective departments of education requiring teachers to pursue either a master's degree or a National Board certificate in order to maintain their teaching license. Furthermore, under *No Child Left Behind*, schools are being identified as "failing" solely based on student test scores. It is necessary for the politicians, policy makers, the respective Departments of Education, and other stakeholders in New Jersey to look to findings from research, using data from New Jersey's public schools to provide guidance in the area of policy development in order to identify the variables that

most affect the performance of students on the New Jersey Assessment of Skills and Knowledge administered in grade 4 (NJASK 4).

For this reason using data from New Jersey's Department of Education, Figure 1 assigns specific variables, that past research has identified and determined as most crucial to student achievement, to an "input" box: School, Student, and Teacher and connecting it to the "output" box: NJASK 4 scores. In this study, a teacher's educational attainment (master's degree and above) serves as a proxy for high quality.

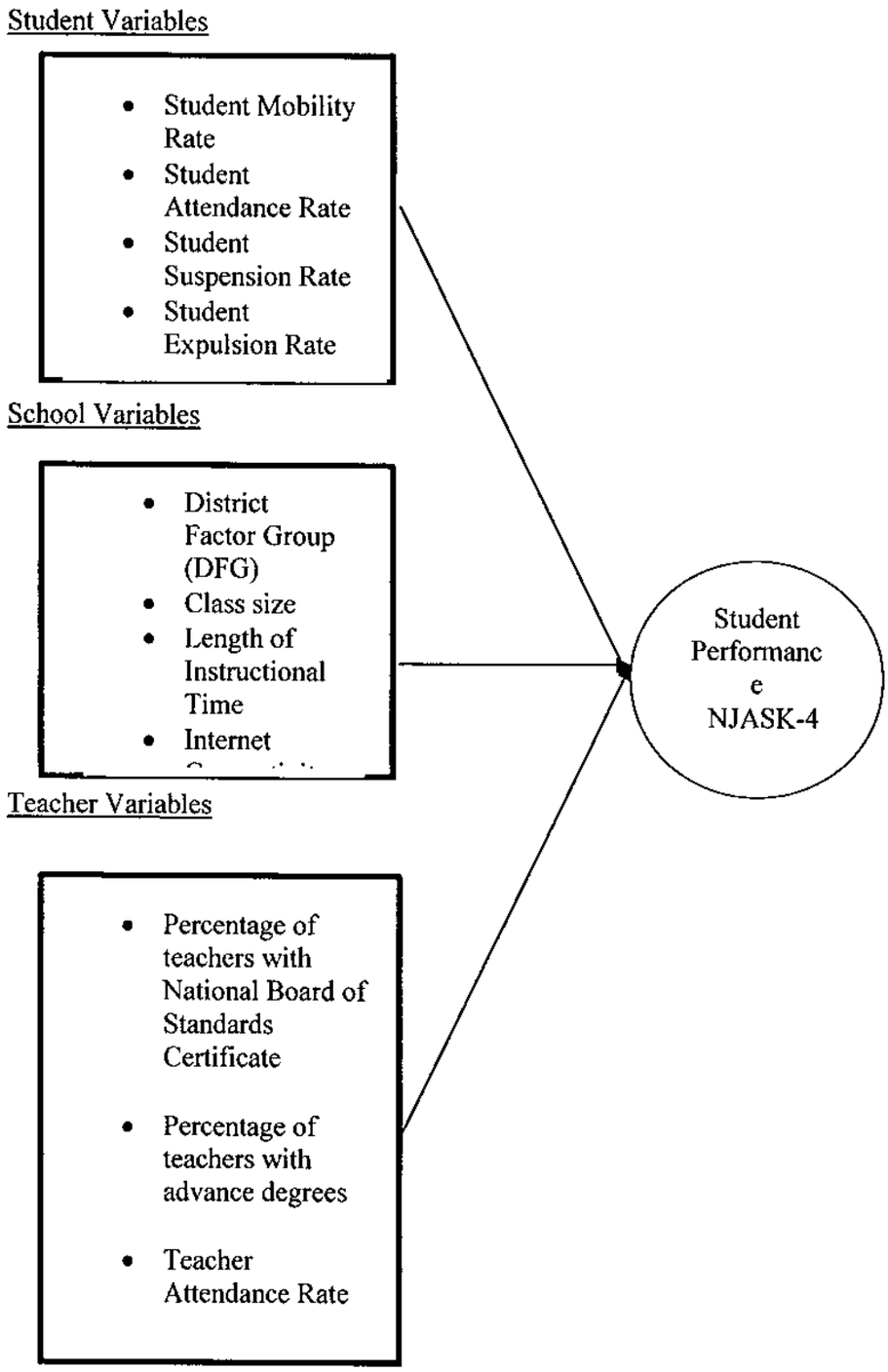

Figure 1. Multiple Regression Model

Statement of the Problem

Does teacher educational attainment in the state of New Jersey affect student achievement? In this study, student achievement is measured by 4th grade students' performance on the New Jersey Assessment of Skills and Knowledge.

The New York City Board of Education operates under the assumption that teacher educational attainment has a positive affect on student achievement and has partnered with local colleges and universities to offer graduate internship programs in an effort to enhance teaching skills. The following is some of the guidelines:

When a student completes 50% of the Master's program requirements (usually 18-24 credits), he or she may be eligible for a New York State internship certificate upon recommendation of the university. An internship certificate is valid for two years as long as the teacher remains in good standing as a student at the university and as a teacher in his or her school. Teachers must apply to a graduate program.

Subsidiary Questions

1. Do student variables such as student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables such as DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables such as National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables (e.g., student, school, teacher) are the strongest predictor of student performance on NJASK 4?

Evident by the twelve variables listed on the New Jersey Department of Education's School Report Card, it is clear that there are many variables that influence student achievement. Notwithstanding, there are many more variables not listed in New

Jersey's school report cards (e.g., child's I.Q., parent(s) education level); that previous studies have indicated as having a significant influence on student achievement. However, the NCLB legislation focuses on the teacher. According to the legislation, the definition of a "highly qualified" teacher in section 9101(23) of the Elementary and Secondary Education Act (ESEA), now known as NCLB, is very specific about the ways in which a teacher may demonstrate subject knowledge and teaching skills. In order to meet the federal definition and mandate of "Highly Qualified Teacher," all teachers must demonstrate the required subject competency and teaching skills either by passing a rigorous subject-matter competency test in each core academic subject they will teach or by demonstrating competencies in each core academic subject on the basis of a "high, objective, uniform, state standard of evaluation. In addition, middle or high school teachers may demonstrate this competency by having majored in the course of study or through other identified ways." (U.S. Department of Education, 2001)

Prior to NCLB, the New Jersey State Department of Education, had already subscribed to the notion that teachers' educational attainment effects student achievement. However, New Jersey uses teacher education as measured by student Grade

Point of Average (GPA) to support this notion. In a press release, the New Jersey Department of Education released this statement:

> Effective 1 September 2000 in accord with N.J.A.C. 6:11-5.1 (a) 1, all applicants for initial New Jersey instructional certification *must* have an cumulative grade point average *of at least 2.75* when a 4.0 equals an A grade at the completion of their baccalaureate degree program. Applications received after 31 August 2000 without the required grade point average will be returned to the applicant.

Since the date of this press release, the Department reported that the State Board of Education proposed changing back to the original State regulations, which would add flexibility to current eligibility requirements for teacher candidates. The change has been adopted, and now allows teacher candidates to apply for teaching certificates if their GPA is at least 2.50. Commissioner of Education, William L. Librera, said "The proposed amendments expand the state's ability to bring new teachers into New Jersey classrooms without compromising quality." (New Jersey Department of Education)

Hypothesis

Using data from the New Jersey Department of Education, the researcher will attempt, through multiple regression, to explore the notion that 4th grade students who attend a school with a high percentage of teachers with advanced degrees (master's degree or above, regardless of specialization) perform better on standardized test than 4th grade students who attend schools with a lower percentage of teachers with advance degrees both within and outside a school's District Factoring Group (DFG).

Therefore, the key hypotheses of this study are:

H_0: The educational attainment of teachers is not the strongest variable on the performance of fourth-grade students as measured by the NJASK 4.

Tested against the alternative:

H_a: The educational attainment of teachers is the strongest variable on the performance of fourth-grade students as measured by NJASK 4.

Purpose of the Study

The purpose of this study is to investigate the extent to which the educational attainment of teachers effect students' NJASK 4 scores. Through multiple regression analysis of data

from the New Jersey Department of Education, schools' NJASK 4 scores will be compared to identify if schools with a higher percentage of teacher's with advanced degree's have higher NJASK 4 scores than those who have less of a percentage of teachers with advanced degrees. For the purpose of this study, teacher educational attainment will be defined as possessing either master's or doctorate degree.

The results of this research will provide administrators with information that can be used to: (a) develop policy regarding hiring practices, (b) assist college and university teacher preparation programs, and (c) structure local professional development practices. Moreover, if the results indicate student and school variables are stronger predictors of students' performance, then schools will be able to arrange their limited resources to the proper areas. Using H. Stanley Judd's quote as a template: A good plan is like a road map (Master's program): It shows the final destination (Higher NJASK4 scores) and usually the best way to get there (Policy).

Significance of the Study

This researcher believes that if the results of this study indicate that teacher educational attainment is the strongest variable (stronger than both student and school variables) in

student NJASK4 scores, districts may decide to attempt to raise standardized test scores by developing policies requiring teachers to pursue a master's degree or implement policies that require current and future teachers to pursue a master's degree in order to maintain their teacher's certificate similar to both New York and Pennsylvania. Currently, New Jersey requires completion of 100 hours of professional development within five years of hire in order to retain certification. Consequently, administrators, superintendents, assistant superintendents, directors, supervisors, principals, assistant principals, and teachers can utilize master's programs as a means to direct professional development activities and simultaneously attempts to improve NJASK4 scores. If the study results reflect a low correlation between teacher educational attainment and student NJASK4 scores, the researcher will report implications of these results for educators and policy makers.

Prior to the reauthorization of ESEA, now known as NCLB, in 2001 by President George W. Bush, The New Jersey Department of Education administered three statewide tests: Elementary School Proficiency Assessment (ESPA), which is a test administered in grade 4; Grade Eight Proficiency Assessment (GEPA), which is a test administered in grade 8; and the High School Proficiency Test (HSPT), which is a test administered in grade 11. Students must pass the HSPT or an alternative test to

graduate high school. Theoretically, they are all based on the New Jersey Core Content Standards (NJCCCS), which were adopted by the State Board of Education on May 1, 1996 and describe the knowledge and skills *all New Jersey students* are expected to acquire by the benchmark grades of four, eight, and eleven. These standards, published by the Department, are established for the establishment of a thorough and efficient education pursuant to N.J.S.A. 18A:7F-4 and as *a basis for the evaluation of school districts* in accordance with N.J.A.C. 6:8-2.1(a). In order to comply with NCLB, the state of New Jersey now plans to test children from grades 3-8 and eleventh.

Delimitations of the Study

The results of the study only reflect the scores from the NJASK4

4th grade students in the 2003-2004 school year. It covers two subjects (Math and Language Arts). Consequently, the study could not determine a baseline for students' performance or the effects of the teacher on science, social studies, and other content areas not assessed.

The data on the teachers are cross-sectional. Hence, the study could not determine the level of influence of students' previous teachers on test scores.

The researcher could not determine through the New Jersey Department of Education's School Report Cards the field in which the degrees are earned (e.g., Master's degree in education, administration, reading, etc…).

The researcher could not determine through the individual schools' report cards if the teacher(s) with the advanced degree(s) was the primary teacher for the students in the 4th grade.

Lastly, no data-set can hope to capture all of the characteristics of a school environment that might influence student learning. (e.g., delivery of instruction, structure of program, instructional material utilized etc…).

CHAPTER II

Review of Related Literature

When comparing teachers with teacher education degrees and others with degrees in disciplinary fields, the majority of the early literature on the subject has suggested no correlation between degree type and teacher performance. Recently, when using teachers' scores on the subject matter tests on the National Teachers Examination's (NTE) the literature on teacher educational attainment and student achievement suggested that teachers' subject matter knowledge and student achievement were not highly correlated indicating that a consistent relationship did not exist between subject matter knowledge and teacher performance as measured by student achievement. At best, it only showed small, statistically insignificant relationships, both positive and negative (Molnar's, 2002).

However, the rationale and premise for such debate is that standardized tests that teachers take, can seemingly indicate whether teachers possess knowledge that translates into better teaching. Especially for subject matter teaching in which the idea is for teachers to use college-level subject matter knowledge for

day-to-day teaching decisions (i.e., college-level subject matter knowledge may impact such areas as, how to design and implement lessons, as well as how to respond to student questions). Combined with this rationale is the assumption that teachers also use subject matter knowledge to design their course curricula, with the proper focus and attention to disciplinary concepts critical to student learning (U.S. Department of Education, 2001).

Advocates for teachers having a general master's degree, suggest that teachers who possess broad, general knowledge can help students learn by connecting content from various disciplines. Consequently, teachers with more general knowledge can better respond to students' questions and create more learning opportunities *(*U.S. Department of Education, *2001).*

In contrast, Johnson (2000) using data from 1998's National Assessment of Educational Progress (NAEP; an exam developed by the federal department of education and given once every two years) of 4th and 8th grade students concluded that in reading and math, 8th grade students whose teachers possess an advanced degree in the field of education, performed worse on the NAEP exam than those whose teachers had an advanced degree in English or bachelor's or advanced degree in math or science. Among 4th grade students, there was no significant difference in achievement between students whose teachers possessed a

bachelor's degree in reading or math when compared to students whose teacher have an advanced degree in education. In fact, the study states "A teacher's education may be less important for achievement than the parent's education."..."math and reading scores rise if at least one parent holds a bachelor's or postgraduate degree" (p. 2). However, it does acknowledge that as students age, a teacher's degree, especially those with subject degrees, have positive effects on student achievement.

However, one of the strongest positions found in the literature skeptical of such reports that demonstrate a strong relationship between teacher educational level and student achievement is Molnar's (2002) report that:

> In spite of their contribution, macro-studies of the relationship between teacher characteristics as a school, district, or state "input" and student achievement as an "output" have several limitations: they must rely on imperfectly measured "background characteristics" of students to equate unequal conditions; they can not without substantial and seldom realized extensions, resolve the ambiguity of the direction of the casual influence. Does a high percentage of Master's degrees raise student achievement, or do districts with able students who learn

> quickly and easily attract teachers with Master's degree? (p. 8.3)

The report goes on to make the suggestion that the selection of a teacher should not be based on the results from paper-and-pencil tests nor from a teacher's academic records.

Notwithstanding, Molnar (2002) acknowledges and agrees with the findings of studies that suggest students of regularly licensed teachers achieve at far more superior levels than students of emergency certified teachers. Also, more experienced teachers generate superior student achievement than less experienced teachers. In addition, there is a "modest" relationship between teacher's college course work in the subject they teach and student achievement.

Harold Wenglinsky's (2000) study attempts to identify the type of professional development that should be supported:

> Improving teacher quality has become the subject of numerous policy proposals at federal and state levels. In the wake of efforts to raise academic standards across the country, policymakers have expressed concern that many teachers are not prepared to help students meet the new standards. Proposals to remedy this situation have included increasing teacher salaries to attract better qualified teachers; requiring more education, such as a master's degree; or

> requiring a major in the subject a prospective teacher plans to teach… The assumption these proposals make is that such efforts will improve teacher quality, resulting in student academic performance. Unfortunately, the empirical evidence on this contention is extremely mixed. (p. 6)

Harold Wenglinsky (2000) like Johnson (2000) utilized data from NAEP to help identify the most important quality or experience of a teacher that impacts student achievement. The data used were from the 7,146 eighth graders who took the NAEP mathematics assessment in 1996, and the 7,776 eighth graders who took the NAEP science assessment in 1996. Three types of teacher quality were measured, including: (a) Teacher variables such as teacher education levels, and years of experience; (b) classroom practices, such as small-group instruction or hands-on learning; and (c) professional development, meaning training to support classroom practices. The major finding in this study was that, among eighth-grade teachers who taught math or science, one out of three teachers had at least a master's degree, and that only majoring or minoring in the relevant subject is associated with improved student academic performance. Students whose teacher majored or minored in the subject they were teaching, outperformed their peers by about 40% in both math and science.

Moreover, Ronald F. Ferguson's (1991) study suggested that combined measures of teachers' expertise scores on a licensing examination, experience, master's degree, along with a measure of school and class size accounted for more of the variance in students' reading and math achievement scores in grades 1 to11, than student socioeconomic status alone (43% teacher qualifications, 8% school and class size, and 49% home and family). After controlling for socioeconomic status, the variance in students' scores was most attributed to teacher qualities. In fact, Ferguson's study suggests that every dollar spent on qualified teachers achieves greater gains than dollars spent on school resources.

Ferguson and Ladd (1996) conducted a similar study in Alabama, which found a positive relationship between teachers' composite ACT college entrance examination scores (e.g., English, mathematics, social studies, reading, and natural sciences), and the achievement of students in the third and fourth grade in district level analysis. They used data from 127 school districts and created artificial gain scores using achievement data from third and fourth graders, and eighth and ninth graders, all from the 1990-1991 school year. The average differences in each district between the math scores of younger students and older students were positively related to the average teacher ACT score in the district.

In conclusion, the study indicated that together, teachers' education, experience, and academic ability, combined with class sizes, explain 31.5% of the predicted difference in reading and math student achievement gains between school districts scoring in the top and bottom quartiles in math, while 29.5% was attributed to poverty, race, and parent education.

In the study by Sanders and Rivers (1996), the data was from the Tennessee Value-Added Assessment System (TVAAS) that investigated the effect that individual teachers had on student academic growth. The Tennessee Value-Added Assessment System provides access to approximately 3 million records of Tennessee's student population from grades 2-8 including histories of student achievement in mathematics, reading, language arts, science, and social studies from 1990-1996. As stated by the authors of the study, it "affords a unique opportunity to investigate the cumulative effects of teachers on student academic achievement over grade levels" (p. 1). The study focused on the cumulative teacher effects in mathematics from grades 3-5 from two of Tennessee's largest school systems. Teachers were grouped into five quintiles, the teachers with the lowest degree of effectiveness were placed in the first quintile and each succeeding level of teaching effectiveness placed in the subsequent quintile,

resulting with the highest degree of teaching effectiveness in the fifth quintile.

The findings from this study reflect a powerful relationship between teacher effectiveness and student achievement. After three years, differences in student achievement of 50 percentile points were observed when comparing students who had teachers in the fifth quintile (highest level of teacher effectiveness) with those who had teachers in the first quintile (lowest level of teacher effectiveness). Included in the findings was as teacher effectiveness increases, lower achieving students are the first to benefit.

Like many other studies of education that focuses on student performance, one may question whether test scores are good indicators of the future success of students, such as the level of education that he/she eventually completes, or the amount of wealth that he/she accumulates. Today, economists are developing models linking the public's educational level and the economy. Businesses in the private sector has had a long tradition of complaining that schools are doing a poor job of preparing students for the market place and their voices are being heard by economists, parents, policy makers, and most importantly politicians. Notwithstanding, studies have indicated that student performance on standardized testing has been positively linked to

the probability of being admitted into colleges and earning a degree. Data has also indicated that there is a high correlation between one's level of education and income.

With the continued growing debate and the recent increase in the literature suggesting that teachers have more of an influence on student performance than previously thought, and the combination of very few studies having explored the notion of teacher educational attainment on student performance, it is critical that the impact of teacher educational attainment on student performance be investigated further. For the purpose of this study, we will review literature in respect to each variable identified in Figure 1, as listed in the school report card in the state of New Jersey.

Student Variables

Student Attendance

Raising student attendance is consistently one of the goals of schools and school districts. It is common sense that unless a student is in school to learn, he/she will miss what is being taught. In fact, the study conducted by Public Policy Institute of California (2003), concluded that, "the percentage of days a student was absent was a strong, negative predictor of each student's gain in achievement in math and reading." (p.12)

Another study that investigated the relationship between student attendance rate and student achievement was referred to by

David Wheat (1997). The study investigated the impact of the truancy program that was implemented by the Governor and the General Assembly in 1996 in Virginia. The program estimated that reducing excessive absenteeism in the public schools by 25% would result in 22,000 more students scoring above the national average on standardized test. The author states:

The connection between attendance and achievement is grounded in common sense. Unless a student is productively engaged… he will find it difficult to learn what is taught in school in his absence. In the Virginia study, a statistical analysis revealed that even after the social and economic factors were held constant, schools with higher attendance rates achieved higher test scores. (p. 2)

Student Mobility

Based on 2000 U.S. census data, student mobility which is defined as a student moving from one school to another, showed that 15% to18% of school age children moved in the previous year. There is an expectation, with more and more schools being identified as "failing," this percentage is expected to increase due to the No Child Left Behind Act provision that allows parents to transfer their child from a "failing" school. One characteristic of schools serving disadvantaged students is that these students tend to be very transient. Students who experience frequent transfers

are likely to suffer academically, due to the emotional impact of frequent changes, exposure to different curricula, different teaching styles, and a whole host of other obstacles to learning. The relationship between student mobility and student performance as listed below, have been well documented. Overall, studies have found students who are identified as "mobile" have on average lower achievement than "non-mobile" students. A study in 1994, conducted by the U.S. General Accounting Office, found that frequent school changes were associated with a host of problems, including nutrition and health related problems as well as below-grade-level reading scores and increased retention. Another study in Baltimore conducted by Alexander, Entwisle, and Dauber (1996) found that mobility during elementary school had a negative association with test scores, grades, special education referral, and retention in the fifth grade. Another study by Simpson and Fowler (1994) found that three or more family moves predicted retention. Furthermore, a study by Swanson and Schneider (1999) using a national data base of 10,000 high school students found that school mobility between the 1st and 8th grades increased the odds of dropping out of school during high school even after controlling for eight-grade achievement.

Student Suspension

School discipline problems have a clear, negative impact on academic achievement. A first of it's kind study by Barton, Coley, and Wenglinsky (1998), sponsored by Educational Testing Service (ETS), found that students with discipline problems have lower test scores. The study analyzed a database of 16,000 students nationwide who were surveyed between 1988 and 1994. They received the discipline records and test scores of the students as they progressed from the 8th to 12th grade. They found that students who had committed minor or more serious offenses scored lower on achievement test than students who did not by ten percent.

School Variables

DFG-SES

Probably the largest and most referenced study on the impact of student background on student achievement is the study sanctioned by the U.S. government, under President Lyndon B. Johnson titled Equality of Educational Opportunity, commonly known at the Coleman (1966) Report. The Coleman Report studied the relationship between student test scores and schools. The report used aggregated measures of school inputs (i.e., teacher

characteristics, educational levels of families, teacher's average level of education) as variables, and socioeconomic status.

Coleman used surveys/questionnaires to collect data from 60,000 teachers and 570,000 students for analysis. To Coleman's surprise, he and his colleagues found a weak relationship between schools and student test scores. He found that socioeconomic measures such as parental education and occupation seemed to explain almost all of the variance in student achievement. In fact, socioeconomic status explained a greater proportion of student test scores than other measures of school resources such as class size and teacher characteristics; 49% student background, approximately 42% teacher quality, and 8% class size. The report showed that a school's average student characteristic, such as poverty and attitudes toward school often had a greater impact on student achievement than teachers and schools, and that the average teacher characteristics at a school had a small impact on a school's mean achievement.

Other researchers have had similar findings. The Goldhaber report (2002) states that based on his previous work:

8.5% of the variation in student achievement is due to teacher characteristics... About 60% of the differences in student test scores are explained by individual and family background characteristics. Only about 3% of the contribution teachers made

to student learning were associated with teacher experience, degree attainted, and either readily observable characteristics. (p. 4)

Within this report were certain observations based on 1993 and 1994 data from the Baccalaureate and Beyond survey that indicated that college graduates who entered public school teaching averaged a 923 on the SAT's. When compared to students entering other professions, it is 80 points lower and the difference is much more dramatic when the scores are compared to technical professions such as engineering. The study concluded, "All the influences of a school, including school-, teacher-, and class-level variables, both measurable and immeasurable, were found to account for approximately 21 percent of the variation in student achievement" (p. 3) However, adding a caveat to the data and its analyses:

> This 21 percent is composed mainly of characteristics that were *not* directly quantified in the analyses. Since we used statistical models that included many observable school-, teacher-, and class-level variables-such as school and class size, teachers' levels of education and experience, and schools' demographic makeup-it is clear that the things that make schools and teachers effective defy easy measurement (p. 3)

A recent report from Public Policy Institute of California (2003) indicates that there were three outcomes from their study. First, teacher education, credentials, experience, and expertise in the subject area do make a difference in student performance. Second, the rate of learning of the student is related to the achievement level of the student in their prior grade and third "the daunting achievement gaps between students do not appear to be created primarily by the schools as they now exist. Taking everything into account, income, and socioeconomic status still matter, and they matter a great deal." (Betts, Rice, & Zau. p. 4)

One of the key findings from the study was that in all grades, the gap in student performance between students in the most and least disadvantaged schools was significantly large. "A first important observation is that students, from very early in their educational experiences, appear to exhibit large variations in achievement that are systematically linked to poverty" (Betts, Rice, & Zau. p. 8). In New Jersey, DFG represents the socioeconomic status of a community.

Class Size

The most seminal study to date of the positive effects of class size is found in the Tennessee STAR (1999) report. The study which began in 1985, randomly assigned students in

kindergarten through 3rd grade to one of three groups. The first group had class size as low as 15 students, the second group had class size in the low 20's with a paraprofessional/aide, and the third group had the same class size without a paraprofessional/aide. The results indicate that students placed in the first group learned more quickly than other students. The students who benefited most showing the largest gains from the smaller class size, were students with the lowest socioeconomic status particularly, students from the inner city. Overall, students in smaller classes had a 4.5 percentile point advantage over the other students at the end of 3rd grade. One caveat, once students were returned to regular class size after 3rd grade, the 4.5 percentile point was reduced to 1 percentile point by the end of 8th grade. It is also important to note that no other interventions accompanied the assignment of pupils to small classes. Teachers were given no additional training during the school year or any other time. Both groups of students were exposed to the same curriculum and materials.

However, aforementioned follow up studies indicate that the students who were in small classes were less likely to be retained in grade or drop out. These students also had better high school graduation rates, graduated with higher rankings, took more advance courses, had higher grade point averages, and were more

likely to enroll in post secondary education than student non-STAR students.

A study by Jepsen and Rivkin (2002), indicates that class size reduction led to increased student performance in test scores and had more of an impact than teacher qualifications. The study stems from a voluntary program to reduce class size in K-3 by one-third in California schools. The study indicates that students in the smaller classes, with high quality teachers, had a positive effect on student achievement. The effect was even greater in schools serving poor students, particularly African-American students. However, the authors concluded that implementing the program in urban schools was especially tenuous. The positive effects from class reduction is mitigated due to teacher quality being lower in the urban schools because more experienced teachers left the urban schools to pursue new opportunities created by the class reduction initiative in less troubled schools. Consequently, the urban schools, had to fill those vacancies with inexperienced and uncertified teachers. The result was that 30% of students in poor schools were being taught by a teacher who was uncertified.

Another study that recently attempted to investigate correlations in student achievement was conducted by the National Center for Education Statistics (NCES, 2000), which utilized the School and Staffing Survey (SASS) consisting of surveys of

districts, schools, principals, and teachers associated with a national sample of schools. The study report provided information on policies, services, programs, services, and enrollment at district and school levels. It also included information on teachers' background and training. The SASS was combined with data from NAEP to analyze correlations to student achievement and the results indicated:

> Student academic performance is shaped by multiple factors, relating to the school, the teaching process, the students' social and family background, and the community." ... We model student achievement in American public schools as related to four types of factors: (a) students' background, (b) organizational features of the school, (c) professional characteristics of the teachers, and (d) school behavior climate. While all these factors affect student academic success, they also interact with each other. (p. 8)

In regards to professional characteristics of the teachers, the report noted that 40% of teachers in the elementary schools had a master's degree. Teacher qualification as a factor was calculated from years of teaching and the percentage of the teachers who acquired a master's degree. The notion in operation in this study is that more qualified teachers have better classroom management

and interpersonal skills and are more familiar with teaching practices and the content they are teaching. Based on these findings, it appears students who are taught by more qualified teachers or those attending schools with a higher percentage of more qualified teachers performed better on achievement tests due to the school's assumed ability to create a more effective learning experience for students. The report's conclusion on teacher qualification indicated that: "Unfortunately, although teachers' qualifications are included in the analysis, the factor is relatively weak, compared to the other factors" (p. 22). Factors such as class size. "The clearest result with respect to correlates of achievement is that average achievement scores are higher in schools with smaller class sizes" (p.22). The findings from the study is supported by the Finn and Achilles (1990) study on the affects of class size, which contain the statement "common sense suggests that it has an effect on students' academic performance" (p. 19)

The U.S. Department of Education (1998) analyzed twenty years of data on the impact of class size reduction in a document titled Reducing Class Size: What Do We Know. The report indicated that research indicates:

1. A consensus of research indicates that class size reduction in the early grades (kindergarten through third) leads to higher student achievement.

2. The most significant effects of class size reduction on student achievement appear when class size is reduced to between 15 and 20 students.

3. The related student achievement moves the average student from the 50th percentile up to approximately the 60th percentile. Disadvantaged and minority students benefited "somewhat" more.

Length of Instructional Time

Within the state of New Jersey there is little variation across school districts regarding instructional time. The range of school days is approximately 180 days a year and 6.5 hours a day. However, the variable of instructional time must be understood as multifaceted. Below, are the different components of instructional time based on research:

Allocated time: Usually defined as the time the state, district, school, or teacher provides the student for instruction.

Instructional time: The time teachers are actively teaching.

Time-on-task: Usually defined as engaged time on a particular learning task(s).

Academic learning time: The time teachers can prove that students learned the content or mastered the skill

Transition time: Usually defined as the non-instructional time before and after instructional activity.

Waiting time: Usually defined as the time that a student must wait to receive some instructional help.

All the above components of instructional time are subject to a variety of factors (i.e., schedules for special classes, assemblies and other special programs, lunch periods, teacher planning time, and taking attendance). Elementary school schedules are generally determined by three factors: (a) the number of instructional minutes of each subject area as mandated by the district or the state and (b) special class schedules, such as art, music, physical education, world language, and library and the overall school schedule (i.e., bus schedules, lunch times, etc). The time frame for each subject area in the elementary school is usually dictated by grade level.

Research on instructional time and its' impact on student learning is closely related to research in other areas such as tutoring and homework. Notwithstanding, a research study by Hossler, Stage, &Gallagher (1988) indicates that there is a positive relationship between time-on-task and student achievement. It should be noted that this relationship is stronger than allocated time and student achievement. Moreover, research by Walberg (1988) indicates that there is a strong positive relationship between

academic learning time and student achievement and attitude. Another study by Brown & Saks (1986) indicates that increasing allocated or engaged time is most beneficial to lower-ability students than to higher ability students; higher ability students only benefit slightly, if at all. In addition, increased time-on-task is most beneficial in the more highly structured content areas such as math and foreign languages than in the less structured ones such as language arts and social studies.

Internet Connectivity

Since educators first began to use computers in the classroom, researchers have tried to evaluate whether the use of educational technology has a significant and reliable impact on student achievement. Because effective use of technology must be supported by a significant amount of money to invest in hardware, software, infrastructure, professional development, and support services, there is now an increasing demand for evidence that the investment in technology will increase student performance.

However, assessing the effect of technology on student performance is a complex process, and moreover, there are many types of technology that serve different educational purposes, (e.g., word processing, e-mailing, database, and spreadsheets among

many others). For the purpose of this study only internet connectivity will be used.

Because most research on technology and student achievement has used traditional standardized assessments to measure changes in student achievement that have little to do with technology, literature specifically linking a schools' internet connectivity to improved student achievement is non-existent with one *possible* exception.

In an article by Ron Reed (2003), the author makes the following statement based on "first-of-its-kind" research. "Study shows the use of standards-based video content, powered by a new internet technology application, increases student achievement" (p. 1). The study is based on teachers incorporating standards-based video clips into their lessons. The technology used is a browser-based internet system developed by the company United Learning. It consisted of 1,500 videos and 15,000 chaptered clips with standards-based core curriculum educational video, teacher guides, student activities, quizzes, and teacher resources. The study indicates that 1,400 elementary and middle school students in three Virginia school districts showed an average increase of 12.6% (the study did not indicate what assessment tool was utilized) when exposed to the unitedstreaming technology vs. students who received only traditional instruction. Notwithstanding, this study

met and is in compliance with the No Child Left Behind standard of a "scientifically based research," instructional program and has the following quote from U.S. Representative Johnny Isakon, Vice-chair of the Web-Based Education Commission "The United Learning standards-based application, unitedstreaming, is a great example of how technology can be used to further *student achievement*" (p.1)

Teacher Variables

Faculty Attendance

There are many legitimate reasons for a teacher to be absent (i.e., illness, professional development, family bereavement etc). When teachers are absent for any of the reasons above, substitute teachers take their place. In New Jersey, the requirement for a substitute teacher is 60 credits. Hence, the quality of instruction is compromised when a teacher is out a single day and more so when he/she is out for an extended period of time. Anecdotal evidence indicates that sometimes as teachers approach retirement age, they frequently use their sick days so as to ease into retirement. The implications of such behavior are that student learning is impacted by the change in the delivery of instruction from a fully credentialed and permanent teacher to a part time and substitute teacher. In a January 19, 2004 article in the Miami

Herald newspaper, a Sentinel review of the performance of students in 62 Orange County language arts, English and reading-related classes found students who had spent at least four weeks with substitute teachers scoring 11 points lower on the reading portion of the FCAT than others in the same school.

Some districts have developed creative ways to offset the potential negative impact of teacher absenteeism by having a permanent fully certified teacher on staff to step in the place of the regularly assigned teacher who is absent.

National Board Certified Teachers

North Carolina Governor Jim Hunt spearheaded the move with other educational leaders to find a sponsor to fund a national teacher certification program based on the notion that a rigorous national teacher certificate would serve as proxy for "exemplary" teaching. The Carnegie Corporation along with its 33-member committee then formed what we now know as the National Board for Professional Teachings Standards bases its' existence on the belief that "the single most important action this country can take to improve schools and student learning is to strengthen teaching (p.1)"

A study conducted by a team of researchers at the University of North Carolina at Greensboro (Bond, Hattie, Jaeger, & Smith, 2000), is the first comprehensive study to compare teaching practices of National Board Certified Teachers (NBCT's) with non-National Certified Board Teachers. The study compared samples of student work from classrooms of the two groups of teachers. The study revealed that NBCTs scored higher on all 13 dimensions of "teaching expertise." The student work samples were evaluated by a separate team of teachers who had no knowledge of the of the certification status on the student's teachers. Seventy-four percent of the work samples collected from students taught by NBCTs reflected a high level of comprehension of the concepts being taught compared to 29% of the work samples of students taught by non-NBCTs.

The population for the study was 65 teachers from three areas: North Carolina, Ohio, and Washington, DC. The 13 dimensions are: (a) Use of Knowledge, (b) Deep Representations, (c) Problem Solving, (d) Improvisation, (e) Classroom Climate, (f) Multidimensional Perception, (g) Sensitivity to Context, (h) Monitor Learning, (i) Test Hypotheses, (j) Passion, (k) Respect, (l) Challenge, and (m) Deep Understanding. However, the study failed to match students with standardized test scores.

As a result, the U.S. Department of Education has recently provided the addition of two grants to study this area. One to Wendy McColskey of University of North Carolina at Greensboro, to investigate the validity of National Board Certification by examining and comparing student achievement of students who are taught by NBCTs and non-NBCTs. The findings from the study titled "Teacher Effectiveness and Student Learning" is scheduled to be released in May 2004. The second is to Tracy Smith of Appalachian State University, who will also investigate the impact of NBCTs on student learning. This study will focus on the quality of work produced by students when taught by NBCTs vs. non-NBCTs. This study, is scheduled to be released in December 2004.

A recent study by Goldhaber, Perry, & Anthony (2004), compared elementary NBCT to unsuccessful NBPTS applicants and non-applicants in the attempt to assess the relationship between NBCT and elementary level student achievement. Utilizing student and teacher data from North Carolina's Department of Public Instruction (NCDPI) for school years 1996-97 through 1998-99, the findings indicate NBCT's have a more positive impact (an average of 7% higher in reading and math), on student achievement than non-NBCT's.

The voluntary teacher certification process offered by NBPTS is designed to be a signal that a teacher has achieved a level of teaching mastery, far beyond that required for a standard state teaching license, that may actually be related to teaching skills and student learning. (p. 6)

In analyzing the data, the researchers indicated "having a master's degree "continuous" teaching license from the state were both positive and significant in test-score growth for the reading and math models" (Goldhaber, Perry, & Anthony 2004, p. 8). The study also indicates that NBCT's have the greatest impact on students reading and math scores who participate in the free of reduced lunch program.

The effect size of having a current NBCT for poor students was estimated to be 13 and 11 percent of a standard deviation in reading and math respectively, compared to effect sizes of 2 and 6 percent of a standard deviation in reading and math for those students who did not participate. (p. 24)

The positive effects of NBCTs on student achievement were seen in all three grades 3, 4, and 5. However, the greatest impact was observed in the 3rd grade; leading the researcher to state "these results at least suggest that greater benefits are provided to students if NBCTs are assigned to teach the earlier grades" (p. 25)

According to the National Board for Professional Teaching Standards, currently, 39 states offer salary supplements, fee reimbursements, bonuses, or other financial incentives to teachers who achieve NBCT. Thus far, over 9,300 teachers from all 50 states have completed the assessment process.

Teachers with Advance Degrees

Although NCES report indicates that other reports such as NELS:88 and NAEP (when specific teacher questionnaires were matched to specific students' performance) are more appropriate for assessing the correlation between teacher qualifications and achievement, we will review recent studies on the impact of teacher educational attainment and student achievement that do not have this component.

The Goldhaber & Brewer (1996) study, which used data from the National Educational Longitudinal Study of 1998, a nationally representative survey of about 24,000 eighth grade students in the spring of 1998 who later on were resurveyed and retested in the tenth grade of spring of 1990 found that the percentage of teachers *within a school* having a master's degree were statistically insignificant in the four subject areas of math, science, English, and history. Upon using a "subject-specific" model in analysis of the same sample, these authors report that the

data suggested that a teacher with a subject-specific degree in math or science had a statistically significant impact on student test scores in the respective subjects in relation to teachers without a degree in those subjects. Conversely, in English and history, the results were statistically insignificant. This study would suggest that there is a statistically significant relationship between a teacher having a degree or an advanced degree in mathematics and science and increased student achievement, but not in English and history.

Ashton & Crockers (1987) suggested that there is a positive impact of education coursework that positively impacts a teacher's effectiveness. In another study, Denton & Lacina (1984) suggested that a positive relationship exists between teachers' professional education coursework and teaching performance, including student achievement. Moreover, in two separate studies Andrew & Schwab (1995) and Denton & Peters (1988) examining 5-year teacher education programs, programs that include the obtaining of a master's, concluded that graduates of these programs are more confident and effective in their teaching skills when compared to graduates of 4-year programs.

For policy makers, these findings suggest we invest money in teacher preparation programs that provide teachers with a master's degree. When teachers enter the profession, they will be

more effective. For those who are current practitioners, they should be encouraged to pursue a master's degree in order to improve their overall skill level.

At a minimum, the findings suggest schools and school districts should earmark their local professional development budget monies toward teachers earning a master's degree or perhaps developing a partnership with colleges and/or universities to provide similar educational experiences typically found in a master's program.

Linda Darling-Hammond's (2000) report cites research that utilized the Tennessee Value-Added Assessment System as well as a similar database in Dallas, Texas. The researcher stated that other studies conducted using their data analysis method have suggested that teacher effectiveness is a strong factor in the producing differences in student learning and that students who were assigned to ineffective teachers, consecutively, have significantly lower achievement and gains in achievement than other students who were assigned to highly effective teachers. These results lead to the question of what qualities make a teacher effective.

Using data from a 50-state survey of policies, state case study analyses, the 1993-1994 School and Staffing Surveys (SASS) and the National Assessment of Education Progress (NAEP), Darling-

Hammond (2000) investigates ways in which teacher qualifications and other school factors are related to student achievement across states. The qualities typically used are: (a) academic ability, (b) years of teaching experience, (c) teaching behaviors in the classroom, and (d) teacher knowledge. Reported findings are:

> Student characteristics such as poverty, non-English language status, and minority status are negatively correlated with student outcomes, and usually significantly so... Teacher quality characteristics such as certification status and degree in the field to be taught are very significantly and positively correlated with student outcomes...Characteristics such as educational level (percentage of teachers with master's degrees) show positive but less strong relationships with education outcomes... Other school resources, such as pupil-teacher ratios, class sizes, and the other proportion of school staff who are teachers, show very weak and rarely significant relationships to student achievement when they are aggregated to the state level. (p. 26)

Darling-Hammond (2000) concludes that "among variables assessing teacher 'quality,' the percentage of teachers with full certification and a major in the field is a more powerful predictor of student achievement than teachers' education level (master's degree)" (p. 36). Darling-Hammond indicates that this may be due

to the fact that master's degrees range from specialist degrees in reading and special education to administrative degrees. All of which *may* have little to do with the teaching-learning process.

Given the fact that new studies continue to emerge that suggest teachers have more of an impact than previous studies have suggested, the debate has now shifted toward identifying what characteristics of teachers are most important, (i.e., innate qualities such as I.Q, undergraduate coursework, teaching experience, pedagogical techniques, or level of educational attainment). Tennessee has proposed using student test scores to demonstrate that their teachers are highly qualified. As previously mentioned, Tennessee has a data system which allows them to track the progress of individual students on state tests over time and has the potential to determine teacher effect on student achievement. Although, at the time of this writing, it is still in the proposal stage, it represents how states are under pressure, in large part, to comply with NCLB mandates, as well as, continues the debate regarding the effect teachers have on student achievement. Hopefully, this study will shed more light on the subject, add to the body of literature, and most importantly, help advance the discussion toward well thought-out policy for all children.

CHAPTER III

Methodology

For the purpose of this study, the researcher utilized a multiple, or multivariate, regression instead of bivariate (simple) regression. Oftentimes, two or more variables have separate effects that cannot be isolated. It would be difficult to tell whether differences in test scores were caused by either or both independent variables if bivariate regression were used. Therefore, multiple linear regression was the model used to conduct this study using the type of data found on the New Jersey Department of Education website: three numeric independent variables (student, school, and teacher variables) and a numeric dependent variable (NJASK 4 scores). In other words, the Multiple linear regression aimed to find a linear relationship between the dependent variable (NJASK 4 scores) and several possible predictor variables (student, school, and teacher variables).

Multiple regression also allowed the researcher to ask the question "What is the best predictor of NJASK 4 scores." However, the major limitation of regression techniques is that one can only establish relationships. Notwithstanding, the regression

models explained the variation in the dependent variable (NJASK 4 scores) rather accurately. The F statistic allowed the researcher to determine whether the whole model was statistically significant. The R^2 ranges from 0 to 1 and is interpreted as the percentage of the variance in the dependent variable (NJASK 4 scores) that is explained by the independent variables (student variables, school variables, and teacher variables). The adjusted R^2 statistic is the same as the R^2 except that it takes into account the number of independent variables.

This study made use of data from a cross-section of schools from the New Jersey Department of Education's report card on schools. This data included other individual schools' enrollment, student mobility, class size, NJASK4 scores, and percentage of teachers with degrees. Schools were randomly selected in number to reflect 20% of New Jersey Public Schools Districts with all the District Factoring Groups represented proportionally.

Students' scores on the NJASK4 fell in one of three categories:

Partially proficient: Means a score achieved by a student below the cut score (100-199) which demarks a partial understanding of the content measured by an individual section of any State assessment.

Proficient: Means a score achieved by a student at or above the cut score (200-249) which demarks a solid understanding of the content measured by an individual section of any State assessment.

Advanced proficient: Means a score achieved by a student at or above the cut score (250-300) which demarks a comprehensive and in-depth understanding of the knowledge and skills measured by a content-area component of any State assessment. (New Jersey State Department of Education)

The results of the state's tests are published in many area newspapers thus enabling comparisons among school districts to be made. This subsequently impacts home values, school morale, perception of the community, and other areas such as businesses.

Moreover, in New Jersey, the Department of Education arranges school district into District Factor Group (DFG's): The DFG is an indicator of the socioeconomic status of citizens in each school district. The DFG designations were updated in 1992 using the following demographic variables from the 1990 United States Census:

A. Percent of adult residents who failed to complete high school

B. Percent of adult residents who attended college

C. Occupational status of adult household members:

1 = laborers

2 = service workers (except private and protective)

3 = farm workers

4 = operatives and kindred workers

5 = protective service workers

6 = sales workers

7 = clerical and kindred workers

8 = craftsmen, foreman, and kindred workers

9 = quasi-professionals

10 = managers, officials, and proprietors

11 = old and new professionals

D. Population Density:

persons per square mile

E. Income:

median family income

F. Unemployment:

percent of those in the work force who received some unemployment compensation

G. Poverty:

percent of residents below the poverty level

The variables described above were combined using a statistical technique called principal components analysis, which resulted in a single measure of socioeconomic status for each district. Districts were then ranked according to their score on this measure and divided into eight groups based on the score interval in which their scores were located. Eight DFGs have been created based on the 1990 United States Census data. They range from A (lowest socioeconomic districts) to J (highest socioeconomic districts) and are labeled as follows: A, B, CD, DE, FG, GH, I, J (New Jersey Department of Education)

The number DFG's and the number in each group is listed below:

DFG	*Number of Districts*
A	35
B	78
CD	75
DE	100
FG	87
GH	78
I	105
J	15

Superintendents, principals, and teachers in each of the respective DFGs are under political, federal, state, and local pressures to not only have the highest test scores within their DFG but also within the state. The only guarantee of this occurring would be for 100% of the students within the district to score in the advanced proficient level in all areas of the test.

Furthermore, within school districts, schools are also compared to each other based on students' test scores, which lends more credence to the question "*What is the effect of teacher educational attainment on student achievement*?"

Sample

The sample for this study consisted of schools that submitted all the required information relating to the student, school, and teacher variables.

District Factor Group	*Schools in Sample*
A	232
B	125
CD	99
DE	137
FG	103

GH	79
I	106
J	7
Total	888

Afterward, similar to previous research, the researcher employed a multiple regression model (the term was first used by Pearson, 1908) to determine the impact of several independent or predictor variables on a dependent variable. The multiple regression model was used to analyze factors in the report card that are typically associated with student achievement: (a) District Factoring Group (DFG), (b) class size, (c) student mobility rate, (d) student attendance rate, (e) student suspension, (f) student expulsion, (g) faculty attendance rate, (h) internet connectivity, and (i) length of school day. Hence, the dependent variable is student achievement defined as NJASK 4 scores. For the purpose of this study, the primary independent variable is teacher educational attainment.

Instrumentation

The NJASK 4 is a criterion-referenced, standards based assessment, that was administered in 2003-2004 during a week in May to all fourth grade students in the state of New Jersey. This

assessment is not based on comparisons between students, but rather their performance in relationship to New Jersey Core Curriculum Content Standards. NJASK 4 measures proficiency in Language Arts and Mathematics.

Data Analysis

Multiple Linear Regression Models were employed using NJASK 4 achievement scores as the dependent measures and school variables, student variables, and teacher variables as independent variables. The independent variables for each model were as follows: Model I 1.Student Variables: Student Mobility Rate, Student Attendance Rate, Student Suspension Rate, and Student Expulsion Rate.

Model II Student variables: Student Mobility Rate, Student Attendance Rate, Student Suspension Rate, Student Expulsion Rate and, School variables: District Factor Group (DFG), Class size, Internet Access and Length of School Day.

Model III Student variables: Student Mobility Rate, Student Attendance Rate, Student Suspension Rate, Student Expulsion Rate, School variables: District Factor Group (DFG), Class size, Internet Access, and Length of School Day, and Teacher variables: Percentage of teachers with National Board of Standards Certificate, Percentage of teachers with a Master's

Degree, Percentage of teachers with Doctorate Degree, and Faculty Attendance Rate.

Definition of Terms

Student Mobility Rate	This is the percentage of students who entered and left during the school year. The calculation is derived by the sum of students entering and leaving after the October enrollment count divided by the total enrollment.
Student Attendance Rate	These are the grade-level percentages of students on average who are present at school each day.
Student Suspensions	These are percentages of students who were suspended at least once during the school year. Students suspended more than one time are counted once.
Student Expulsions	These are percentages of students who were expelled from the school during the year.
Average Class Size	Average class size for elementary schools

	(PreK-8) is based on the enrollment per grade divided by the total number of classrooms for that grade.
Length of School Day	This is the amount of time a school is in session for a typical student on a normal school day.
Internet Connectivity	This shows the percentages of room locations in school that are wired for the Internet and where students' use of the Internet is monitored.
Faculty Attendance Rate	This is the average daily attendance for the faculty of the school. It is calculated by dividing the total number of days present by the total number of days contracted for all faculty members.
Faculty Degrees	These are the percentages of administrators and faculty in the school possessing an academic degree(s) as of October each year. They are calculated by dividing the numbers of each academic degree by the total number of faculty and administrators.

National Board Certification	This shows the number of teachers who applied for and the number who achieved certification during the school year. This rigorous certification is encouraged, but not required.

The analysis focused on the R^2 change to determine whether or not the contribution each set of variables made to the regression model was significant. Furthermore, comparisons of the Betas enabled the determination of the relative contribution of each independent variable to predict performance on the NJASK 4.

CHAPTER IV

Analysis of the Data

As previously stated, with teachers as the central focus of the No Child Left Behind Act which legislates each state in the country to have a "Highly Qualified" teacher in each classroom, combined with New Jersey's border states (New York and Pennsylvania), mandating teachers to pursue either a master's degree or a National Board Certificate in order to maintain their teaching license, it is necessary for research to identify what variables (e.g., student, school, or teacher) that most effect the performance of students on the NJASK 4. Thereby, with the hope of assisting in developing policies that prevent schools from being identified as "failing" under No Child Left Behind solely based on poor student test scores.

For the first time in the state of New Jersey, the Department of Education used Microsoft's Excel as the means to enter school report cards and other data in the public domain. The list began with 1,329 schools but 441 of them were eliminated leaving 888 schools because they did not have the complete set of student, school, and teacher variables needed for this study.

Table 1

Number of Students Tested

	N	Min	Max	Sum	*M*	SD
Language	888	11	565	72267	81.38	49.621
Math	888	11	568	72241	81.35	49.621
Valid N (listwise)	888					

The sample for this study was 888 public schools in the state of New Jersey. The minimum of 4th grade students tested in a school was 11 and the maximum was 568, the average number of 4th grade students tested in a school for both Math and Language Arts was approximately 81. In this sample, the highest total number of 4th grade students tested is 72, 267 with 26 more 4th grade students tested in Math than in Language Arts.

Table 2

Student Performance in Math

	N	Min	Max	M	SD
Partially Proficient					
Math (%)	888	.0	94.4	35.742	19.7554
Proficient Math (%)	888	4.2	74.1	42.094	10.7134
Advanced					
Proficient Math (%)	888	.0	69.7	22.165	14.3604

Valid N (listwise) 888

The performance of 4th grade students in math range from schools having 5.6% of their 4th grade students performing at the Proficient or Advanced Proficiency level to 100% of their 4th grade students performing at the Proficient or Advanced Proficiency level. Combining the Means of Partially Proficient, Proficient, and Advanced Proficient in Math, the average school performance on the NJASK 4 Math section is approximately 36% Partially Proficient, 42% Proficient, and 22% Advanced Proficient. With 72,267 students tested in Math, this translates to 26,016 4th grade students identified as Partially Proficient, 30,352 4th grade students identified as Proficient, and 15,899 4th grade students identified as Advanced Proficient in Math.

Table 3

Student Performance in Language Arts

	N	Min	Max	M	SD
Partially Proficient					
Language (%)	888	.0	84.2	25.904	17.5704
Proficient Language (%)	888	15.8	97.6	71.214	15.8157
Advanced Proficient					
Language (%)	888	.0	24.0	2.882	3.9421
Valid N (listwise)	888				

The performance of 4th grade students in Language Arts range from schools having 15.8% of their 4th grade students performing at the Proficient or Advanced Proficiency level to 100% of their 4th grade students performing at the Proficient or Advanced Proficiency level. Based on the means of Partially Proficient, Proficient, and Advanced Proficient in Language Arts, the average school performance on the NJASK 4 Language Arts section is approximately 26% Partially Proficient, 71% Proficient, and 3% Advanced Proficient. With 72,241 students tested in Language, this translates to 18,783 4th grade students identified as Partially Proficient, 51,291 4th grade students identified as Proficient, and 2,167 4th grade students identified as Advanced Proficient in Language Arts.

Summary of Student Performance

Overall, there are more 4th grade students and a higher percentage of them performing in the Proficient or Advanced Proficient level in the Language Arts section of the NJASK 4 test (53,458, 74%) than in the Math section (46,251, 64%) respectively. Notwithstanding, more 4th grade students and a higher percentage of them are performing at the Advanced Proficient level in the Math section of the NJASK 4 test (15,899, 22%) than in the Language Arts section (2,167, 3%) respectively.

Table 4

Profile of Variables

	N	Min	Max	*M*	SD
DFG	888	1	8	3.50	2.115
Grade 4 Student Attendance (%)	888	86.3	99.9	95.592	1.3427
Student Mobility (%)	887	0	63.4	15.306	10.3255
Suspensions (%)	887	0	44	4.27	5.432
Expulsions (%)	887	0	0	.00	.014
Class Size	888	10.0	37.0	20.788	3.6652
Total School Day (in Minutes)	888	335	445	387.16	14.054
All Internet Access (%)	887	0	100	95.39	17.550
Computer Lab with Internet Access (%)	887	0	100	80.72	39.357
Library with Internet Access (%)	887	0	100	93.19	25.131
Class with Internet Access (%)	887	0	100	94.67	19.074
Faculty Attendance (%)	888	0	100	96.06	4.747

Masters Degree (%)	888	3	82	33.06	12.518
Doctorate Degree (%)	888	0	16.7	.868	1.7513
Nationally Board Certified (Applied)	888	0	2	.02	.156
Nationally Board Certified (Complete)	888	0	1	.00	.034

In analysis of the student, school, and teacher variables impact on student performance on NJASK 4, one school was not part of the analysis, because it did not have any of the student variables and/or any of the school variables relating to Internet Access. Hence, only 887 schools are considered valid for analysis. Moreover, there is little variance in the sample for the following independent variables: Student Expulsion, National Board Certified Applied, and National Board Certified Complete. Consequently, these three independent variables were eliminated from the analysis.

Using the Mean as a basis, a composite of the sample is as follows: 1. *Student Variables*: 96% Grade 4 attendance rate, Mobility at a 15% percent rate, and a Suspension rate of 4%. 2. *School variables*: 4th grade class size of 20, hours in school 6.45, Computer Lab with Internet Access 81%, Library with Internet

Access 93%, Classroom with Internet Access 95%, All Internet Access 95% and a District Factor Group (DFG) of 3.5 in a range from 1-8. 3. *Teacher variables*: Faculty Attendance Rate of 96%, Percentage of Teachers with a master's degree 33%, and Percentage of Teachers with a doctorate degree one percent. Since the teacher variable is the central focus of this study, it should be noted in Table 5 that the overall percentage of teachers with a mater's degree in New Jersey is below the national average of forty-one percent.

Table 5

Teacher Educational Attainment by District Factoring Group

DFG	Percentage of Teachers with Master's Degree	Percentage of Teachers with Doctorate Degree
A	29.04	1.340
B	28.91	.408
CD	31.84	.661
DE	30.50	.591
FG	36.12	1.098
GH	39.44	.796
I	42.76	.827
J	52.53	.500

Total 33.12 .874

Again, the multiple regression allowed the researcher to identify the independent variable(s) that most impacted student performance on the NJASK 4 test. The F statistic allowed the researcher to determine whether the whole model is statistically significant. The R^2 ranges from 0 to 1 and is interpreted as the percentage of the variance in the dependent variable (NJASK 4 scores) that is explained by the independent variables (student variables, school variables, and teacher variables). The adjusted R^2 statistic is the same as the R^2 except that it factors in the number of independent variables.

The Beta enabled the researcher to determine the relative contribution of each independent variable(s) in predicting the performance of students on the NJASK 4 test.

Student, School, & Teacher Variables on Student NJASK 4 Partially Proficient Math Scores

Table 6

Analysis of Variance for Partially Proficient Math

	df	F	η	*p*
Model 1				

Student Variables	3	190.431**	886	.000
Residual	883			
Total	886			
Model 2				
School Variables	10	86.302**	886	.000
Residual	876			
Total	886			
Model 3				
Teacher Variables	13	67.676**	886	.000
Residual	873			
Total	886			

*p<.05. **p<.01.

As illustrated in Table 6, a multiple regression analysis was performed with the dependent variable (Y) Partially Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate,

(X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 6 significantly predicted NJASK 4 Partially Proficient Math scores, F = 190.431 (DF 3 + 883) = 886, $p < .000$. R square for the model was .393 and adjusted R square was .391. The analysis also revealed that *Model 2* in table 6 significantly predicted NJASK 4 Partially Proficient Math scores, F = 86.302 (DF 10 + 876) = 886, $p < .000$. R square for the model was .496 and adjusted R square was .491. Lastly, the analysis revealed that *Model 3* in table 6 significantly predicted NJASK 4 Partially Proficient Math scores, F = 67.676 (DF 13 + 873) = 886, $p < .000$. R square for the model was .502 and adjusted R square was .495.

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting Partially Proficient Math Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student			
Attendance (%)	-2.348	.412	-.160*
Student Mobility (%)	906	.056	.474*
Suspensions (%)	.689	.100	.190*

Model 2			
Grade 4 Student			
Attendance (%)	-1.032	.392	-.070*
Student Mobility (%)	.469	.061	.245*
Suspensions (%)	.404	.094	.111*
Class Size	-.210	.133	-.039
Total School Day (in Minutes)	-5.59E-02	.034	-.040
All Internet Access (%)	-4.97E-03	.034	-.004
Computer Lab with Internet Access (%)	-7.38E-03	.012	-.015
Library with Internet Access (%)	3.963E-02	.020	.050*
Class with Internet Access (%)	2.696E-02	.032	.026
DFG	-4.064	.310	-.435*
Model 3			
Grade 4 Student			
Attendance (%)	-.839	.397	-.057*
Student Mobility (%)	.450	.062	.235*

Suspensions (%)	.407	.094	.112*
Class Size	-.193	.133	-.036
Total School Day (in Minutes)	-5.65E-02	.034	-.040
All Internet Access (%)	-3.31E-03	.034	-.003
Computer Lab with Internet Access (%)	-3.92E-03	.012	-.008
Library with Internet Access (%)	3.790E-02	.020	.048
Class with Internet Access (%)	2.573E-02	.032	.025
DFG	-3.886	.321	-.416*
Faculty Attendance (%)	-.199	.102	-.048
Masters Degree (%)	-8.71E-02	.041	-.055*
Doctorate Degree (%)	.368	.278	.033

a. Dependent Variable: Partially Proficient Math (%)

Note. R2 = .393 for Model 1; R2 = .496 for Model 2; R2 = .502 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 7, a standard multiple regression analysis was performed between the dependent variable (Y)

Partially Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate, have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 7, shows that 39.3% of the variance in Partially Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 7 shows that 49.6% of the variance in Partially Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG). The R square in *Model 3* in Table 7 shows that 50.2% of the variance in Partially Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate

Degree, and (X13) Percentage of teachers with a Master's Degree. This indicates by adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Partially Proficient Math.

Strength of the Variables

In *Model 1* of Table 7, the standardized coefficients for predictor of (Y) Partially Proficient Math (X1) Student Suspension Rate is significant with $B = .190$, $t = 6.877$, $p < .000$, (X2) Student Attendance Rate is significant with $B = -.160$, $t = -5.695$, $p < .000$, and (X3) Student Mobility Rate is significant with $B = .474$, $t = 16.140$, $p < .000$.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between both independent variables Student Suspension Rate and Student Mobility Rate and student performing Partially Proficient in Math with Student Mobility Rate being the strongest. However, there is a negative *statistically significant* relationship between Student Attendance Rate and student performing Partially Proficient in Math.

In *Model 2* of Table 7, the following variables are added: (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with B= -.015, t= -.602, p< .548, (X5) Total School Day in Minutes is *not* significant with B= -040, t= -1.642, p< .101, (X6) Library with Internet Access is significant with B= .050, t= 1.967, p< .049, (X7) Class size is *not* significant with B= -.039, t= -1.581, p< .114, (X8) All Internet Access is *not* significant with B= -.004, t= -.145, p< .885, (X9) Class with Internet Access is *not* significant with B= .026, t= .835, p< .404, (X10) District Factor Group (DFG) is significant with B= -.435, t= -13.094, p< .000. The standardized coefficients for predictors of (Y) Partially Proficient Math are reported with (X1) Student Suspension Rate Beta becoming weaker but remaining significant B= .111, t=4.283, p< .000, (X2) Student Attendance Rate Beta becoming weaker but remaining significant B= -.070, t= -.2630, p< .009, and (X3) Student Mobility Rate Beta becoming weaker but remaining significant B= .245, t= 7.639, p< .000.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically*

significant impact on student performance on NJASK 4? *Answer.* There is a positive *statistically significant* relationship between Library with Internet Access and student performing Partially Proficient in Math, however, there is a strong negative *statistically significant* relationship between District Factor Group (DFG) and student performing Partially Proficient in Math. In *Model 2*, all three student variables' relationship with student performance remains consistent and *statistically significant,* but decreases in strength.

In *Model 3* of Table 7, the following variables are added: (X11) Faculty Attendance, (X12) Percentage of teachers with Doctorate Degree, and (X13) Percentage of teachers with a Master's Degree. (X11) Faculty Attendance Rate is *not* significant with B= -.048, t= -1.956, p< .051, (X12) Percentage of teachers with Doctorate Degree is *not* significant with B= .033, t= -2.113, p< .187, and (X13) Percentage of teachers with a Master's Degree is significant with B= -.055, t= -2.113, p< .035. The standardized coefficients for predictors of (Y) Partially Proficient Math are reported with (X1) Student Suspension Rate Beta again becoming weaker but remaining significant with B= .112, t= 4.314, p< .000, (X2) Student Attendance Rate Beta again becoming weaker but remaining significant with B= -.057, t= -.2113, p< .035, (X3) Student Mobility Rate Beta again becoming weaker but remaining

significant with B= .235, t= 7.286, p< .000, (X4) Computer Lab with Internet Access remains *not* significant with B= -008, t= -.319, p< .750, (X5) Total School Day in Minutes remains *not* significant with B= -040, t= -1.665, p< .096, (X6) Library with Internet Access becomes *not* significant with B= .048, t= 1.881, p< .060, (X7) Class size remains *not* significant with B= -.036, t= -1.453, p< .147, (X8) All Internet Access is *not* significant with B= -.004, t= -.145, p< .885, (X9) Class with Internet Access remains *not* significant with B= -.003, t= -.097, p< .923 and (X10) District Factor Group (DFG) Beta again becoming weaker but remaining significant with B= -.416, t= -12.099, p< .000

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between independent variable Percentage of Teachers with a Master's Degree and student performing Partially Proficient in Math. In *Model 3*, all three student variables as well as DFG's relationship with student performance again remains consistent and *statistically significant*, but decreasing in strength.

Strongest Predictor of Student Performance on NJASK 4 Relating to Partially Proficient Math Scores

The data in Table 7 indicates that variable (X10) DFG has the strongest impact on (Y) Partially Proficient Math followed by (X3) Student Mobility, then (X1) Student Suspension Rate. All three *statistically significant* at $p < .000$. The next set of variables that has the strongest impact on (Y) Partially Proficient Math is (X2) Student Attendance Rate followed by (X13) Percentage of Teachers with a Master's Degree both *statistically significant* at $p < .035$. With the exception of (X6) Library with Internet Access in *Model 2*, the remaining variables (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X7) Class size, (X8) All Internet Access (X9) Class with Internet Access, (X11) Faculty Attendance Rate and (X12) Percentage of teachers with Doctorate Degree are never statistically significant. Hence, are not good predictors of Partially Proficient Math.

Student, School, & Teacher Variables on Student NJASK 4 Proficient Math Scores

Table 8

Analysis of Variance for Proficient Math

	df	F	η	*p*
Model 1				
Student Variables	3	59.345**	886	.000
Residual			883	
Total			886	

Model 2				
School Variables	10	21.053**	886	.000
Residual			876	
Total			886	
Model 3				
Teacher Variables	13	17.940**	886	.000
Residual			873	
Total			886	

*$p < .05$. ** $p < .01$.

As illustrated in Table 8, a multiple regression analysis was performed with the dependent variable (Y) Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 8 significantly predicted NJASK 4 Proficient Math

scores, F= 59.345 (DF 3 + 883) =886, p< .000. R square for the model was .168 and adjusted R square was .165. The analysis also revealed that *Model 2* in Table 8 significantly predicted NJASK 4 Proficient Math scores, F= 21.053 (DF 10 + 876) =886, p< .000. R square for the model was .194 and adjusted R square was .185. Lastly, the analysis revealed that *Model 3* in Table 8 significantly predicted NJASK 4 Proficient Math scores, F= 17.940 (DF 13 + 873)= 886, p< .000. R square for the model was .211 and adjusted R square was .199

Table 9

Summary of Hierarchical Regression Analysis for Variables Predicting Proficient Math Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student			
Attendance (%)	.963	.262	.121*
Student Mobility (%)	-.332	.036	-.320*
Suspensions (%)	-.171	.064	-.087 *
Model 2			
Grade 4 Student			
Attendance (%)	.647	.269	.081*
Student Mobility (%)	-.227	.042	-.219*

Suspensions (%)	-9.35E-02	.065	-.047
Class Size	.200	.091	.068*
Total School Day (in Minutes)	2.104E-02	.023	.028
All Internet Access (%)	-3.79E-02	.024	-.062
Computer Lab with Internet Access (%)	3.471E-03	.008	.013
Library with Internet Access (%)	-2.28E-02	.014	-.053
Class with Internet Access (%)	2.285E-02	.022	.041
DFG	.921	.213	.182*
Model 3			
Grade 4 Student Attendance (%)	.519	.271	.065
Student Mobility (%)	-.204	.042	-.196*
Suspensions (%)	-.109	.064	-.055
Class Size	.197	.091	.067*
Total School Day (in Minutes)	2.284E-02	.023	.030

All Internet Access (%)	-4.05E-02	.023	-.066
Computer Lab with Internet Access (%)	1.730E-03	.008	.006
Library with Internet Access (%)	-2.69E-02	.014	-.063
Class with Internet Access (%)	2.086E-02	.022	.037
DFG	1.045	.219	.206*
Faculty Attendance (%)	.113	.070	.050
Masters Degree (%)	-4.55E-02	.028	-.053
Doctorate Degree (%)	-.703	.190	-.115*

a. Dependent Variable: Proficient Math (%)

Note. R2 = .168 for Model 1; R2 = .194 for Model 2; R2 = .211 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 9, a standard multiple regression analysis was performed between the dependent variable (Y) Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access,

(X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 9, shows that 16.5% of the variance in Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 9, shows that 18.5% of the variance in Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). The R square in *Model 3* in Table 9, shows that 19.9% of the variance in Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. This indicates by adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Proficient Math.

Strength of the Variables:

In *Model 1* of Table 9, the standardized coefficients for predictor of (Y) Proficient Math (X1) Student Suspension Rate is significant with B= -.087, t= -2.690, p< .007, (X2) Student Attendance Rate is significant with B= .121, t= 3.674, p< .000, and (X3) Student Mobility Rate is significant with B= -.320, t= -9.300, p< .000.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a statistically significant impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between independent variable Student Attendance Rate and student performing Proficient in Math. However, there is a negative *statistically significant* relationship between both variables Student Suspension Rate and Student Mobility Rate and student performing Proficient in Math.

In *Model 2* of Table 9, the following variables are added: (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with B= .013, t= .412, p< .680,

(X5) Total School Day in Minutes is *not* significant with $B = .028$, $t = .900$, $p < .368$, (X6) Library with Internet Access is *not* significant with $B = -.053$, $t = -1.648$, $p < .100$, (X7) Class size is significant with $B = .068$, $t = 2.187$, $p < .029$, (X8) All Internet Access is *not* significant with $B = -.062$, $t = -1.610$, $p < .108$, (X9) Class with Internet Access is *not* significant with $B = .041$, $t = 1.031$, $p < .303$, (X10) District Factor Group (DFG) is significant with $B = .182$, $t = 4.323$, $p < .00$. The standardized coefficients for predictors of (Y) Proficient Math (X1) are reported with (X1) Student Suspension Rate becomes not significant with $B = -.047$, $t = -1.442$, $p < .150$, (X2) Student Attendance Rate remains significant with $B = .081$, $t = 2.400$, $p < .017$, and (X3) Student Mobility Rate remains significant with $B = -.219$, $t = -5.391$, $p < .000$.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically significant* impact on student performance on NJASK 4? *Answer.* There is a positive *statistically significant* relationship between Class Size and DFG, with DFG being the strongest in student performing Proficient in Math. In *Model 2*, two of the three student variables (Student Attendance Rate and Student Mobility Rate) relationship with student performance remains consistent but

weaker with Student Suspension Rate becoming *not statistically significant.*

In *Model 3* of Table 9, the following variables are added: (X11) Faculty Attendance, (X12) Percentage of teachers with Doctorate Degree, and (X13) Percentage of teachers with a Master's Degree. (X11) Faculty Attendance Rate is *not* significant with B= .050, t= 1.625, p< .104, (X12) Percentage of teachers with Doctorate Degree is significant with B= -.115, t= -3.694, p< .000, and (X13) Percentage of teachers with a Master's Degree in *not* significant with B= -.115, t= -3.694, p< .106. The standardized coefficients for predictors of (Y) Proficient Math are reported with (X1) Student Suspension Rate remains *not* significant with B= -.055, t= -1.693, p< .091, (X2) Student Attendance Rate becomes *not* significant with B= .065, t= 1.913, p< .056, and (X3) Student Mobility Rate Beta becomes weaker but remains significant with B= -.196, t= -4.831, p< .000, (X4) Computer Lab with Internet Access remains *not* significant with B= .006, t= .206, p< .837, (X5) Total School Day in Minutes remains *not* significant with B= .030, t= .985, p< .325, (X6) Library with Internet Access remains *not* significant with B= -.063, t= -1.955, p< .051, (X7) Class size remains significant with B= .067, t= 2.171, p< .030, (X8) All Internet Access remains *not* significant with B= -.066, t= -1.732, p< .084, (X9) Class with Internet Access remains *not* significant

with B= .037, t= .949, p< .343, (X10) District Factor Group (DFG) remains significant with B= .206, t= 4.761, p< .000.

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a negative *statistically significant* relationship between independent variable Percentage of Teachers with a Doctorate Degree and student performing Proficient in Math. In *Model 3*, Student Attendance Rate becomes *not statistically significant* but Student Mobility Rate, Class Size, and DFG's relationship with student performance again remains consistent and *statistically significant,* but decreasing in strength.

Strongest Predictor of Student Performance on NJASK 4 Relating to NJASK 4 Proficient Math Scores

The data in Table 9 indicates that variables (X10) District Factor Group (DFG) has the strongest impact on (Y) Proficient Math followed by (X3) Student Mobility Rate then (X12) Percentage of teachers with Doctorate Degree, all three *statistically significant* at p< .000. (X7) Class size has the fourth strongest impact with a statistical significance at p< .030. The remaining variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X4) Computer Lab with Internet Access, (X5) Total School

Day in Minutes, (X6) Library with Internet Access (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X11) Faculty Attendance Rate, and (X13) Percentage of teachers with a Master's Degree are *never* statistically significant. Hence, are *not* good predictors of Proficient Math.

Student, School, & Teacher Variables on Student NJASK 4 Advanced Proficient Math Scores

Table 10

Analysis of Variance for Advanced Proficient Math

	df	F	η	*p*
Model 1				
Student Variables	3	133.472**	886	.000
Residual			883	
Total			886	
Model 2				
Teacher Variables	10	66.221**	886	.000
Residual			876	
Total			886	
Model 3				
Student Variables	13	53.535**	886	.000

Residual	873
Total	886

*p< .05. **p< .01

As illustrated in Table 10, a multiple regression analysis was performed with the dependent variable (Y) Advanced Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 10 significantly predicted NJASK 4 Advanced Proficient Math scores, F=133.472 (DF 3 + 883) = 886, $p < .000$. R square for the model was .312 and adjusted R square was .310. The analysis also revealed that *Model 2* in Table 10 significantly predicted NJASK 4 Advanced Proficient Math scores, F= 66.221 (DF 10 + 876) = 886, $p < .000$. R square for the model was .431 and adjusted R square was .424. Lastly, the analysis revealed that *Model 3* in Table 10 significantly predicted NJASK 4 Advanced Proficient Math scores, F= 53.535

(DF 13 + 873) = 886, $p < .000$. R square for the model was .444 and adjusted R square was .435.

Table 11

Summary of Hierarchical Regression Analysis for Variables Predicting Advanced Proficient Math Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student			
Attendance (%)	1.384	.319	.130*
Student Mobility (%)	-.574	.043	-.413*
Suspensions (%)	-.517	.077	-.196*
Model 2			
Grade 4 Student			
Attendance (%)	.384	.303	.036
Student Mobility (%)	-.241	.047	-.174*
Suspensions (%)	-.311	.073	-.118*
Class Size	1.085E-02	.103	.003
Total School Day (in Minutes	3.500E-02	.026	.034
All Internet Access (%)	4.315E-02	.027	.053
Computer Lab with			

Internet Access (%)	3.955E-03	.009	.011
Library with Internet Access (%)	-1.69E-02	.016	-.030
Class with Internet Access (%)	-5.00E-02	.025	-.067*
DFG	3.143	.240	.463*
Model 3			
Grade 4 Student Attendance (%)	.319	.305	.030
Student Mobility (%)	-.246	.047	-.177*
Suspensions (%)	-.297	.072	-.113*
Class Size	-3.81E-03	.102	-.001
Total School Day (in Minutes)	3.382E-02	.026	.033
All Internet Access (%)	4.403E-02	.026	.054
Computer Lab with Internet Access (%)	2.238E-03	.009	.006
Library with Internet Access (%)	-1.11E-02	.015	-.019
Class with Internet			

Access (%)	-4.68E-02	.025	-.062
DFG	2.841	.247	.418*
Faculty Attendance (%)	8.612E-02	.078	.029
Masters Degree (%)	.133	.032	.116*
Doctorate Degree (%)	.334	.214	.041

a. Dependent Variable: Advanced Proficient Math (%)

Note. R2 = .310 for Model 1; R2 = .424 for Model 2; R2 = .435 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 11, a standard multiple regression analysis was performed between the dependent variable (Y) Advanced Proficient Math and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 11 shows that 31% of the variance in Advanced Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 11 shows that 42.4% of the variance in Advanced Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2)

Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG). The R square in *Model 3* in Table 11 shows that 43.5% of the variance in Advanced Proficient Math is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. This indicates by adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Advanced Proficient Math.

Strength of the Variables:

In *Model 1* of Table 11, the standardized coefficients for predictor of (Y) Advanced Proficient Math (X1) Student Suspension Rate is significant with $B = -.196$, $t = -6.677$, $p < .000$, (X2) Student Attendance Rate is significant with $B = .130$, $t =$

4.341, $p < .000$, and (X3) Student Mobility Rate is significant with $B = -.413$, $t = -13.221$, $p < .000$.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between independent variable Student Attendance Rate and students performing Advanced Proficient in Math. However, there is a negative *statistically significant* relationship between both Student Suspension Rate and Student Mobility Rate and student performing Advanced Proficient in Math.

In *Model 2* of Table 11, the following variables are added (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with $B = .011$, $t = .417$, $p < .677$, (X5) Total School Day in Minutes is *not* significant with $B = .034$, $t = 1.331$, $p < .184$, (X6) Library with Internet Access is *not* significant with $B = -.030$, $t = -1.086$, $p < .278$, (X7) Class size is *not* significant with $B = .003$, $t = .106$, $p < .916$, (X8) All Internet Access is *not* significant with $B = .053$, $t = 1.628$, $p < .104$, (X9)

Class with Internet Access is significant with B= -.067, t= -2.006, p< .045, (X10) District Factor Group (DFG) is significant with B=.463, t= 13.104, p< .000. The standardized coefficients for predictors of (Y) Advanced Proficient Math (X1) are reported with (X1) Student Suspension Rate remains significant with B= -.118, t= -4.258, p< .000, (X2) Student Attendance Rate becomes *not* significant with B= .036, t= 1.268, p< .205, and (X3) Student Mobility Rate remains significant with B= -.174, t= -5.092, p< .000.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between DFG and student performing Advanced Proficient in Math. However, there is a negative *statistically significant* relationship between Class with Internet Access and student performing Advanced Proficient in Math. In *Model 2*, Student Attendance Rate becomes not *statistically significant* but Student Mobility Rate, and Class Size, relationship with student performance remains consistent and *statistically significant,* but decreasing in strength.

In *Model 3* of Table 11, the following variables are added: (X11) Faculty Attendance, (X12) Percentage of teachers with Doctorate Degree, and (X13) Percentage of teachers with a Master's Degree. (X11) Faculty Attendance Rate is *not* significant with B= .029, t= 1.101, p< .271, (X12) Percentage of teachers with Doctorate Degree is *not* significant with B= .041, t= 1.560, p< .119, and (X13) Percentage of teachers with a Master's Degree is significant with B= .116, t= 4.195, p< .000. The standardized coefficients for predictors of (Y) Advanced Proficient Math are reported with (X1) Student Suspension Rate remains significant with B= -.113, t= -4.108, p< .000, (X2) Student Attendance Rate remains *not* significant with B= .030, t= 1.045, p< .296, and (X3) Student Mobility Rate remains significant with B= -.177, t= -5.184, p< .000, (X4) Computer Lab with Internet Access remains *not* significant with B= .006, t= .237, p< .813, (X5) Total School Day in Minutes remains *not* significant with B= .033, t= 1.297, p< .195, (X6) Library with Internet Access remains *not* significant with B= -.019, t= -.715, p< .475, (X7) Class size remains *not* significant with B= -.001, t= -.037, p< .970, (X8) All Internet Access remains *not* significant with B= .054, t= 1.677, p< .094, (X9) Class with Internet Access becomes *not* significant with B= -.062, t= -1.894, p< .059, (X10) District Factor Group (DFG) remains significant with B= .418, t= 11.516, p< .000.

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between independent variable Percentage of Teachers with a Master's Degree and student performing Advanced Proficient in Math. In *Model 3*, all three student variables relationship with student performance remains consistent. However, in *Model 3* Class with Internet Access becomes not significant but DFG remains *statistically significant* but decreasing in strength.

Strongest Predictor of Student Performance on NJASK 4Relating to NJASK 4 Advanced Proficient Math Scores

The data in Table 11 indicates that variable (X10) District Factor Group (DFG) has the strongest impact on (Y) Advanced Proficient Math followed by (X3) Student Mobility Rate, (X13) Percentage of teachers with a Master's Degree, and (X1) Student Suspension Rate in that order. All four are *statistically significant* at $p < .000$. With the exception of (X9) Class with Internet Access, in *Model 2*, the remaining variables (X2) Student Attendance Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access (X7) Class size, (X8) All Internet Access, (X11) Faculty Attendance Rate and

(X12) Percentage of teachers with Doctorate Degree are never statistically significant. Hence, they are not good predictors of Advanced Proficient Math.

Student, School, & Teacher Variables on Student NJASK 4 Partially Proficient Language Scores

Table 12

Analysis of Variance for Partially Proficient Language Arts

	df	F	η	*p*
Model 1				
Student Variables	3	237.921**	886	.000
Residual			883	
Total			886	
Model 2				
School Variables	10	119.235**	886	.000
Residual			876	
Total			886	
Model 3				
Teacher Variables	13	95.399**	886	.000
Residual			873	
Total			886	

*p < .05. **p < .01.

As illustrated in Table 12, a multiple regression analysis was performed with the dependent variable (Y) Partially Proficient Language and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree, and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 12 significantly predicted NJASK 4 Partially Proficient Language scores, F= 237.921 (DF 3 + 883)=886, p< .000. R square for the model was .447 and adjusted R square was .445. The analysis also revealed that *Model 2* in Table 12 significantly predicted NJASK 4 Partially Proficient Language scores, F= 119.235 (DF 10 + 876)=886, p< .000. R square for the model was .576 and adjusted R square was .572. Lastly, the analysis revealed that *Model 3* in Table 12 significantly predicted NJASK 4 Partially Proficient Language scores, F= 95.399 (DF 13 + 873)=886, p< .000. R square for the model was .587 and adjusted R square was .581.

Table 13

Summary of Hierarchical Regression Analysis for Variables Predicting Partially Proficient Language Arts Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student Attendance (%)	-2.548	.350	-.195*
Student Mobility (%)	.859	.048	.505*
Suspensions (%)	.577	.085	.178*
Model 2			
Grade 4 Student Attendance (%)	-1.194	.320	-.091*
Student Mobility (%)	.430	.050	.253*
Suspensions (%)	.287	.077	.089*
Class Size	-.174	.108	-.036*
Total School Day (in Minutes)	-4.62E-02	.028	-.037
All Internet Access (%)	3.328E-02	.028	.033
Computer Lab with Internet Access (%)	3.515E-03	.010	.008
Library with Internet			

Access (%)	3.624E-02	.016	.052*
Class with Internet			
Access (%)	2.875E-02	.026	.031
DFG	-4.010	.253	-.482*
Model 3			
Grade 4 Student			
Attendance (%)	-.928	.322	-.071*
Student Mobility (%)	.405	.050	.238*
Suspensions (%)	.295	.076	.091*
Class Size	-.142	.108	-.030
Total School Day (in			
Minutes)	-4.47E-02	.028	-.036
All Internet Access (%)	3.719E-02	.028	.037
Computer Lab with			
Internet Access (%)	5.687E-03	.010	.013
Library with Internet			
Access (%)	3.528E-02	.016	.050*
Class with Internet			
Access (%)	2.842E-02	.026	.031
DFG	-3.837	.260	-.461*

Faculty Attendance (%)	-9.72E-02	.083	-.026
Masters Degree (%)	-.107	.033	-.077*
Doctorate Degree (%)	.709	.226	.071*

a. Dependent Variable: Partially Proficient Language Arts (%)

Note. R2 = .447 for Model 1; R2 = .576 for Model 2; R2 = .587 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 13, a standard multiple regression analysis was performed between the dependent variable (Y) Partially Proficient Language and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate

have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 13 shows that 44.5% of the variance in Partially Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 13 shows that 57.2% of the variance in Partially Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5)

Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG). The R square in *Model 3* in Table 13 shows that 58.1% of the variance in Partially Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. By adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Partially Proficient Language.

Strength of the Variables:

In *Model 1* of Table 13, the standardized coefficients for predictor of (Y) Partially Proficient Language (X1) Student Suspension Rate is significant with $B = .178$, $t = 6.777$, $p < .000$, (X2) Student Attendance Rate is significant with $B = -.195$, $t = -7.277$, $p < .000$, and (X3) Student Mobility Rate is significant with $B = .505$, $t = 18.008$, $p < .000$.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between both independent variables Student Suspension Rate and Student Mobility Rate and student performing Partially Proficient in Language Arts with Student Mobility Rate being the strongest. However, there is a negative *statistically significant* relationship between Student Attendance Rate and student performing Partially Proficient in Language Arts.

In *Model 2* of Table 13, the following variables are added: (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with $B = .008$, $t = .351$, $p < .726$, (X5) Total School Day in Minutes is *not* significant with $B = -.037$, $t = -1.663$, $p < .097$, (X6) Library with Internet Access is significant with $B = .052$, $t = 2.204$, $p < .028$, (X7) Class size is *not* significant with $B = -.036$, $t = -1.603$, $p < .109$, (X8) All Internet Access is *not* significant with $B = .033$, $t = 1.189$, $p < .235$, (X9) Class with Internet Access is *not* significant with $B = .031$, $t = 1.091$, $p < .275$, (X10) District Factor Group (DFG) is significant with $B = -.482$, $t =$

-15.831, $p < .000$ are added to the model, the standardized coefficients for predictors of (Y) Partially Proficient Language (X1) are reported with (X1) Student Suspension Rate remains significant with $B = .089$, $t = 3.719$, $p < .000$, (X2) Student Attendance Rate remains significant with $B = -.091$, $t = -3.730$, $p < .000$, and (X3) Student Mobility Rate remains significant with $B = .253$, $t = 8.594$, $p < .000$.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between Library with Internet Access and student performing Partially Proficient in Language Arts. However, there is a strong negative *statistically significant* relationship between District Factor Group (DFG) and student performing Partially Proficient in Language Arts. In *Model 2*, all three student variables relationship with student performance remains consistent but weaker.

In *Model 3* of Table 13, variables (X11) Faculty Attendance Rate is *not* significant with $B = -.026$, $t = -14.737$, $p < .239$, (X12) Percentage of teachers with Doctorate Degree is significant with $B = .071$, $t = 3.143$, $p < .002$, and (X13) Percentage of teachers with a Master's Degree is significant with $B = -.077$, $t =$

-3.215, $p < .001$, are added to the model, the standardized coefficients for predictors of (Y) Partially Proficient Language are reported with (X1) Student Suspension Rate remaining significant with $B = .091$, $t = 3.861$, $p < .000$, (X2) Student Attendance Rate remains significant with $B = -.071$, $t = -2.882$, $p < .004$, and (X3) Student Mobility Rate remains significant with $B = .238$, $t = 8.102$, $p < .000$, (X4) Computer Lab with Internet Access remains *not* significant with $B = .013$, $t = .570$, $p < .569$, (X5) Total School Day in Minutes remains *not* significant with $B = -.036$, $t = -1.623$, $p < .105$, (X6) Library with Internet Access remains significant with $B = .050$, $t = 2.160$, $p < .031$, (X7) Class size remains *not* significant with $B = -.030$, $t = -1.320$, $p < .187$, (X8) All Internet Access remains *not* significant with $B = .037$, $t = 1.342$, $p < .180$, (X9) Class with Internet Access remains *not* significant with $B = .031$, $t = 1.090$, $p < .276$, (X10) District Factor Group (DFG) remains significant with $B = -.461$, $t = -14.737$, $p < .000$.

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between independent variable Percentage of Teachers with Doctorate Degree and student performing Partially Proficient in

Language Arts. However, there is a negative *statistically significant* relationship between independent variable percentage of Teachers with Master's Degree and student performing Partially Proficient in Language Arts. In *Model 3*, all three student variables as well as DFG's relationship with student performance again remains consistent and *statistically significant,* but decreasing in strength.

Strongest Predictor of Student Performance on NJASK 4 Relating to NJASK 4 Partially Proficient Language Arts Scores:

The data in Table 13 indicates that variable (X10) District Factor Group (DFG) has the strongest impact on (Y) Partially Proficient Language followed by (X3) Student Mobility Rate (X1) Student Suspension Rate, (X13) Percentage of teachers with a Master's Degree, (X12) Percentage of teachers with Doctorate Degree, (X2) Student Attendance Rate, and (X6) Library with Internet Access in that order, with all *statistically significant* at $p <$ .31. The remaining variables (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access (X7) Class size, (X8) All Internet Access, (X9) Class with Internet, (X11) Faculty Attendance Rate and are never statistically significant. Hence, they are not good predictors of Partially Proficient Language Arts.

Student, School, & Teacher Variables on Student NJASK 4 Proficient Language Scores

Table 1

Analysis of Variance for Proficient Language Arts

	df	F	η	*p*
Model 1				
Student Variables	3	196.738**	886	.000
Residual			883	
Total			886	
Model 2				
School Variables	10	85.626**	886	.000
Residual			876	
Total			886	
Model 3				
Teacher Variables	13	68.419**	886	.000
Residual			873	
Total			886	

*p < .05. **p < .01.

As illustrated in Table 14, a multiple regression analysis was performed with the dependent variable (Y) Proficient

Language and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 14 significantly predicted NJASK 4 Proficient Language scores, F= 196.738 (DF 3 + 883) = 886, $p<$ .000. R square for the model was .401 and adjusted R square was .399. The analysis also revealed that *Model 2* in Table 14 significantly predicted NJASK 4 Proficient Language scores, F= 85.626 (DF 10 + 876) = 886, $p<$ .000. R square for the model was .494 and adjusted R square was .489. Lastly, the analysis revealed that *Model 3* in Table 14 significantly predicted NJASK 4 Proficient Language scores, F= 68.419 (DF 13 + 873) = 886, $p<$ .000. R square for the model was .505 and adjusted R square was .497.

Table 15

Summary of Hierarchical Regression Analysis for Variables Predicting Proficient Language Arts Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student			
Attendance (%)	2.228	.328	.189*
Student Mobility (%)	-.730	.045	-.477*
Suspensions (%)	-.481	.080	-.165*
Model 2			
Grade 4 Student			
Attendance (%)	1.193	.315	.101*
Student Mobility (%)	-.407	.049	-.265*
Suspensions (%)	-.256	.076	-.088*
Class Size	.162	.107	.038
Total School Day (in Minutes)	3.942E-02	.027	.035
All Internet Access (%)	-4.52E-02	.028	-.050
Computer Lab with Internet Access (%)	-3.99E-03	.010	-.010
Library with Internet Access (%)	-3.38E-02	.016	-.054*
Class with Internet Access (%)	-4.13E-02	.026	-.017

DFG	3.024	.249	.404*
Model 3			
Grade 4 Student			
Attendance (%)	.948	.317	.081*
Student Mobility (%)	-.381	.049	-.249*
Suspensions (%)	-.266	.075	-.091*
Class Size	.136	.106	.032
Total School Day (in			
Minutes)	3.866E-02	.027	.034
All Internet Access (%)	-4.89E-02	.027	-.054
Computer Lab with			
Internet Access (%)	-6.20E-03	.010	-.015
Library with Internet			
Access (%)	-3.40E-02	.016	-.054*
Class with Internet			
Access (%)	-1.45E-02	.026	-.018
DFG	2.914	.257	.389*
Faculty Attendance (%)	.109	.081	.033
Masters Degree (%)	7.524E-02	.033	.060*

Doctorate Degree (%)	-.737	.222	-.082*

a. Dependent Variable: Proficient Language Arts (%)

Note. R2 = .401 for Model 1; R2 = .494 for Model 2; R2 = .505 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 15, a standard multiple regression analysis was performed between the dependent variable (Y) Proficient Language and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree, and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate

have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 15 shows that 39.9% of the variance in Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 15 shows that 48.9% of the variance in Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in

Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG). The R square in *Model 3* in Table 15 shows that 49.7% of the variance in Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. This indicates by adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Proficient Language.

Strength of the Variables:

In *Model 1* of Table 15, the standardized coefficients for predictor of (Y) Proficient Language (X1) Student Suspension Rate is significant with B= -.165, t= -6.027, p< .000, (X2) Student Attendance Rate is significant with B= .189, t= 6.789, p< .000, and (X3) Student Mobility Rate is significant with B= -.477, t= -16.345, p< .000.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between independent variable Student Attendance Rate and student performing Proficient in Language Arts. However, there is a negative *statistically significant* relationship between both variables Student Suspension Rate and Student Mobility Rate and student performing Proficient in Language Arts.

In *Model 2* of Table 15, the following variables are added: (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with B= -.010, t= -.405, p< .686, (X5) Total School Day in Minutes is *not* significant with B= .035, t= 1.442, p< .150, (X6) Library with Internet Access is significant with B= -.054, t= -2.089, p< .037, (X7) Class size is *not* significant with B= .038, t= 1.521, p< .129, (X8) All Internet Access is *not* significant with B= -.050, t= -1.642, p< .101, (X9) Class with Internet Access is *not* significant with B= -.017, t= -.553, p< .581, (X10) District Factor Group (DFG) is significant

with B= .404, t= 12.137, p< .000. The standardized coefficients for predictors of (Y) Proficient Language (X1) are reported with (X1) Student Suspension Rate remaining significant with B= -.088, t= -3.378, p< .001, (X2) Student Attendance Rate remains significant with B= .101, t= 3.787, p< .000, and (X3) Student Mobility Rate remains significant with B= -.265, t= -8.257, p< .000.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically significant* impact on student performance on NJASK 4? *Answer.* There is a positive *statistically significant* relationship between DFG and student performing Proficient in Language Arts. However, there is a negative *statistically significant* relationship between Library with Internet Access and student performing Proficient in Language Arts. In *Model 2*, all three student variables' relationship with student performance remains consistent and *statistically significant,* but decreases in strength.

In *Model 3* of Table 15, variables (X11) Faculty Attendance Rate is *not* significant with B= .033, t= 1.335, p< .182, (X12) Percentage of teachers with Doctorate Degree is significant with B= -.082, t= -3.311, p< .001, and (X13) Percentage of teachers with a Master's Degree is significant with B= .060, t=

2.285, $p < .023$, are added to the model, the standardized coefficients for predictors of (Y) Proficient Language are reported with (X1) Student Suspension Rate remains significant with $B = -.091$, $t = -3.539$, $p < .000$, (X2) Student Attendance Rate remains significant with $B = .081$, $t = 2.987$, $p < .003$, and (X3) Student Mobility Rate remains significant with $B = -.249$, $t = -7.725$, $p < .000$, (X4) Computer Lab with Internet Access remains *not* significant with $B = -.015$, $t = -.630$, $p < .529$, (X5) Total School Day in Minutes remains *not* significant with $B = .034$, $t = 1.425$ $p < .154$, (X6) Library with Internet Access is significant with $B = -.054$, $t = -2.112$, $p < .035$, (X7) Class size remains *not* significant with $B = .032$, $t = 1.284$, $p < .199$, (X8) All Internet Access remains *not* significant with $B = -.054$, $t = -1.791$, $p < .074$, (X9) Class with Internet Access remains *not* significant with $B = -.018$, $t = -.565$, $p < .572$, (X10) District Factor Group (DFG) remains significant with $B = .389$, $t = 11.355$, $p < .000$.

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between independent variable Percentage of Teachers with a Master's Degree and student performing Proficient in Language

Arts. However, there is a negative *statistically significant* relationship between independent variable Percentage of Teachers with a Doctorate Degree and student performing Proficient in Language Arts. In *Model 3*, all three student variables as well as Library with Internet Access and DFG's relationship with student performance remains consistent and *statistically significant,* but decreasing even more in strength.

Strongest Predictor of Student Performance on NJASK 4 Relating to NJASK 4 Proficient Language Scores

The data in Table 15 indicates that variable (X10) District Factor Group (DFG) has the strongest impact on (Y) Proficient Language followed by (X3) Student Mobility Rate, (X1) Student Suspension Rate, (X12) Percentage of teachers with Doctorate Degree, (X2) Student Attendance Rate, (X13) Percentage of teachers with a Master's Degree, and (X6) Library with Internet Access in that order, with all *statistically significant* at $p < .35$. The remaining variables (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet, (X11) Faculty Attendance Rate and are never statistically significant. Hence, are not good predictors of Proficient Language Arts.

Student, School, & Teacher Variables on Student NJASK 4

Advanced Proficient Language Arts Scores

Table 16

Analysis of Variance for Advanced Proficient

	df	F	η	*p*
Model 1				
Student Variables	3	71.046**	886	.000
Residual			883	
Total			886	
Model 2				
School Variables	10	46.636**	886	.000
Residual			876	
Total			886	
Model 3				
Teacher Variables	13	37.210**	886	.000
Residual			873	
Total			886	

*$p < .05$. **$p < .01$.

As illustrated in Table 16, a multiple regression analysis was performed with the dependent variable (Y) Advanced

Proficient Language and independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. The analysis revealed that *Model 1* in Table 16 significantly predicted NJASK 4 Advanced Proficient Language scores, F= 71.046 (DF 3 + 883) = 886, $p < .000$. R square for the model was .194 and adjusted R square was .192. The analysis also revealed that *Model 2* in Table 16 significantly predicted NJASK 4 Advanced Proficient Language scores, F= 46.636 (DF 10 + 876) = 886, $p < .000$. R square for the model was .347 and adjusted R square was .340. Lastly, the analysis revealed that *Model 3* in Table 16 significantly predicted NJASK 4 Advanced Proficient Language scores, F= 37.219 (DF 13 + 873) = 886, $p < .000$. R square for the model was .357 and adjusted R square was .347.

Table 17

Summary of Hierarchical Regression Analysis for Variables Predicting Proficient Language Arts Scores (n=886)

Variable	B	SE B	β
Model 1			
Grade 4 Student			
Attendance (%)	.319	.095	.109*
Student Mobility (%)	-.128	.013	-.336*
Suspensions (%)	-9.59E-02	.023	-.132*
Model 2			
Grade 4 Student			
Attendance (%)	5.548E-02	.089	.000
Student Mobility (%)	-2.36E-02	.014	-.062
Suspensions (%)	-3.03E-02	.021	-.042
Class Size	1.113E-02	.030	.010
Total School Day (in Minutes)	6.698E-02	.008	.024
All Internet Access (%)	1.201E-02	.008	.053
Computer Lab with Internet Access (%)	4.071E-04	.003	.004
Library with Internet Access (%)	-2.45E-03	.005	-.016
Class with Internet			

Access (%)	-1.43E-02	.007	-.069
DFG	.986	.071	.528*
Model 3			
Grade 4 Student			
Attendance (%)	-2.12E-02	.090	-.007
Student Mobility (%)	-2.44E-02	.014	-.064
Suspensions (%)	-2.83E-02	.021	-.039
Class Size	5.337E-03	.030	.005
Total School Day (in			
Minutes)	5.913E-03	.008	.021
All Internet Access (%)	1.183E-02	.008	.053
Computer Lab with			
Internet Access (%)	4.442E-04	.003	.004
Library with Internet			
Access (%)	-1.28E-03	.005	-.008
Class with Internet			
Access (%)	-1.38E-02	.007	-.067
DFG	.923	.073	.494 *
Faculty Attendance (%)	-1.13E-02	.023	-.014
Masters Degree (%)	3.221E-02	.009	.102*

Doctorate Degree (%)	2.785E-02	.063	.012

a. Dependent Variable: Advanced Proficient Language (%)

Note. R2 = .194 for Model 1; R2 = .347 for Model 2; R2 = .357 for Model 3 ($p < .05$). * $p < .05$

As illustrated in Table 17, a standard multiple regression analysis was performed between the dependent variable (Y) Advanced Proficient Language and the independent variables (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. Tests for violations of the assumptions for multiple regressions revealed no violations. This analysis of the SPSS results will answer the following research questions:

1. Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a statistically significant impact on student performance on NJASK 4?

2. When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a statistically significant impact on student performance on NJASK 4?

3. When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a statistically significant impact on student performance on NJASK 4?

4. Which set of variables e.g., student, school, teacher are the strongest predictor of student performance on NJASK 4?

Model Building

The R square in *Model 1* in Table 17 shows that 19.2% of the variance in Advanced Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate. The R square in *Model 2* in Table 17 shows that 34% of the variance in Advanced Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG). The R square in

Model 3 in Table 17 shows that 34.7% of the variance in Advanced Proficient Language is explained by the variance in (X1) Student Suspension Rate, (X2) Student Attendance Rate, (X3) Student Mobility Rate, (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet Access, (X10) District Factor Group (DFG), (X11) Faculty Attendance Rate, (X12) Percentage of teachers with Doctorate Degree and (X13) Percentage of teachers with a Master's Degree. This indicates by adding school and teacher variables, the models are identifying significant variables that impact the dependent variable, Advanced Proficient Language.

Strength of the Variables:

In *Model 1* of Table 17, the standardized coefficients for predictor of (Y) Advanced Proficient Language (X1) Student Suspension Rate is significant with B= -.132, t= -4.161, p< .000, (X2) Student Attendance Rate is significant with B= .109, t= 3.367, p< .001, and (X3) Student Mobility Rate is significant with B= -.336, t= -9.939, p< .000.

Summary of Model 1- Do student variables: student mobility rate, student attendance rate, student suspension rate, and student expulsion rate have a *statistically significant* impact on student

performance on NJASK 4? *Answer*: There is a positive *statistically significant* relationship between independent variable Student Attendance Rate and students performing Advanced Proficient in Language Arts. However, there is a negative *statistically significant* relationship between both Student Suspension Rate and Student Mobility Rate and student performing Advanced Proficient in Language Arts.

In *Model 2* of Table 17, the following variables are added: (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class Size, (X8) All Internet Access, (X9) Class with Internet Access, and (X10) District Factor Group (DFG). (X4) Computer Lab with Internet Access is *not* significant with B= .004, t= .146, p< .884, (X5) Total School Day in Minutes is *not* significant with B= .024, t= .866, p< .387, (X6) Library with Internet Access is *not* significant with B= -.016, t=-.535, p< .593, (X7) Class size is *not* significant with B= .010, t= .369, p< .712, (X8) All Internet Access is *not* significant with B= .053, t= 1.540, p< .124, (X9) Class with Internet Access is *not* significant with B= -.069, t= -.1.953, p< .051, (X10) District Factor Group (DFG) is significant with B= .528, t= 13.98137, p< .000. The standardized coefficients for predictors of (Y) Advanced Proficient Language (X1) are reported with (X1) Student Suspension Rate becomes *not*

significant with B= -.042, t= -1.414, p< .158, (X2) Student Attendance Rate becomes *not* significant with B= .000, t= .006, p< .995, and (X3) Student Mobility Rate becomes *not* significant with B= -.062, t= -1.695, p< .090.

Summary of Model 2- When controlling for student variables, do school variables: DFG, class size, length of school day, instructional time, and internet connectivity have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant* relationship between DFG and student performing Advanced Proficient in Language Arts. In *Model 2*, all three student variables become not statistically significant.

In *Model 3* in Table 17, variables (X11) Faculty Attendance Rate is *not* significant with B= -.014, t= -.487, p< .626, (X12) Percentage of teachers with Doctorate Degree is *not* significant with B= .012, t= .441, p< .659, and (X13) Percentage of teachers with a Master's Degree is significant with B= .102, t= 3.445, p< .001, are added to the model, the standardized coefficients for predictors of (Y) Advanced Proficient Language are reported with (X1) Student Suspension Rate remains *not* significant with B= -.039, t= -1.323, p< .186, (X2) Student Attendance Rate remains *not* significant with B= -.007, t= -.235, p< .815, and (X3) Student Mobility Rate remains *not* significant with B= -.064, t= -1.744, p<

.081, (X4) Computer Lab with Internet Access remains *not* significant with B= .004, t= 159, p< .874, (X5) Total School Day in Minutes remains *not* significant with B= .021, t= 768 p< .443, (X6) Library with Internet Access remains *not* significant with B= -.008, t= -.280, p< .780, (X7) Class size remains *not* significant with B= .005, t= .177, p< .859, (X8) All Internet Access remains *not* significant with B= .053, t= 1.524, p< .128, (X9) Class with Internet Access remains *not* significant with B= -.067, t= -.1.890, p< .059, (X10) District Factor Group (DFG) remains significant with B= .494, t= 12.661, p< .000.

Summary of Model 3- When controlling for student and school variables, do teacher variables: National Board Certification, master's degree, doctorate degree, and attendance rate have a *statistically significant* impact on student performance on NJASK 4? *Answer*. There is a positive *statistically significant relationship* between independent variable Percentage of Teachers with a Master's Degree and student performing Advanced Proficient in Language Arts. DFG relationship to student performing Advanced Proficient in Language Arts remains consistent and *statistically significant* but decreasing in strength.

Strongest Predictor of Student Performance on NJASK 4 Relating to NJASK 4 Advanced Proficient Language Arts Scores

The data in Table 17 indicates that variable (X10) District Factor Group (DFG) has the strongest impact on (Y) Advanced Proficient Language followed by (X13) Percentage of teachers with a Master's Degree, both *statistically significant* at $p < .001$. With the exception of (X1) Student Suspension Rate, (X2) Student Attendance Rate, and (X3) Student Mobility Rate, in Model 1, the remaining variables (X4) Computer Lab with Internet Access, (X5) Total School Day in Minutes, (X6) Library with Internet Access, (X7) Class size, (X8) All Internet Access, (X9) Class with Internet, (X11) Faculty Attendance Rate, and (X12) Percentage of teachers with Doctorate Degree, are never statistically significant. Hence, are not good predictors of Advanced Proficient Language Arts.

Overall Conclusions

When we control for student and school level variables, the percentage of teachers in a school with a master's degree was a significant predictor of student performance when the measures are Partially Proficient and Advanced Proficient in Math and Partially Proficient, Proficient, and Advanced Proficient in Language Arts. At a minimum, the data, albeit weak, indicates there is a positive relationship between, schools with a higher percentage of teachers

with a master's degree and student performance on the NJASK 4 test.

CHAPTER V

Conclusions and Recommendations

With the continued growing debate and the recent increase in the literature suggesting that teachers have more of an influence on student performance than previously thought, it is critical that the impact of teacher educational attainment on student performance be investigated further in relationship to student and school variables. Beginning with Coleman (1966), early research suggested student variables such as I.Q. and socioeconomic status were the biggest predictors of student performance on standardized test. Prior to Coleman's study was the recognition of the role of school variables by the U.S. Supreme Court in the 1954 *Brown v. Board of Education, Topeka*, which ordered a desegregation policy for schools based on the notion that schools and the resources committed to them play a critical role in the type of educational experiences students receive. More recently, the 1990 *Abbott v. Burke* decision, in New Jersey, found the funding process in the state to be unconstitutional and required the state to increase state funding to 30 of New Jersey's poorest school districts commensurate to the higher funded school districts. Included in the funding are monies for new school construction, textbooks,

technology, personnel, and any other resources identified by the 30 districts as necessary to provide students with the educational experiences needed to improve student achievement.

Under the No Child Left Behind Act, one of the sanctions imposed on schools that fail to meet Annual Yearly Progress (A.Y.P) for two consecutive years, regardless of reason, is the provision to allow parents intra-district school choice. The general premise is that schools and the resources they commit to students influence student performance. Another critical component of the No Child Left Behind Act is its focus on the teacher.

Under the No Child Left Behind Act, the teacher is the central focus. In fact, one of its tenets is for every child to be taught by a "highly qualified" teacher. A teacher may demonstrate this competency by having majored in the course of study in which they teach or through other identified ways, including earning a master's degree. Consequently, the question is which of the above variables should the government and/or school districts commit their resources to?

This researcher believes that if the results of this study indicate that teacher educational attainment is the strongest variable (stronger than both student and school variables) in student NJASK 4 scores, districts may decide to attempt to raise standardized test scores by developing policies requiring teachers

to pursue a master's degree or implement policies that require current and future teachers to pursue a master's degree in order to maintain their teacher's certificate similar to New York and Pennsylvania. Using New Jersey's database, this study attempted to provide some potential answers.

Summary of Research Design

The Multiple linear regression aimed to find a linear relationship between the dependent variable (NJASK 4 scores) and several possible predictor variables (student, school, and teacher variables). Multiple Linear Regression Models were employed using NJASK 4 achievement scores as the dependent measures and school variables, student variables, and teacher variables as independent variables. 1.Student variables: Student Mobility Rate, Student Attendance Rate, Student Suspension Rate, and Student Expulsion Rate School variables: District Factor Group (DFG), Class size, Length of School Day, Faculty Attendance Rate; and Teacher variables: Percentage of teachers with National Board of Standards Certificate, Percentage of teachers with a Master's Degree, Percentage of teachers with Doctorate Degree, and Faculty Attendance Rate.

Review of Findings and Interpretation

In both Math and Language, the best predictors of students performing in the Partially Proficient level were DFG, Student Mobility, and Student Suspension Rate in that order. The Teacher variables of Percentage of Teachers with a Master's Degree and student variable of Student Attendance rate were *statistically significant* as well.

In both Math and Language, the best predictors of students performing in the Proficient level were DFG than Student Mobility, followed by Percentage of Teachers with a Doctorate Degree in the Math section and Student Suspension Rate in the Language Arts section, in that order. However, the teacher variable of Percentage of Teachers with a Doctorate Degree was *statistically significant* in both sections. Also, the teacher variable of Percentage of Teachers with a Master's Degree was *statistically significant* in the Language section.

In both Math and Language, the best predictors of students performing in the Advanced Proficient level were DFG, Percentage of Teachers with a Master's Degree (*statistically significant* in both), in that order. However, it should be noted that the student variables of Student Mobility Rate and Student Suspension Rate were both *statistically significant* in *Model 1* in both sections.

In all three categories of student performance: Partially Proficient, Proficient, and Advanced Proficient, in both sections Math and Language of the NJASK 4 test, the following variables were statistically significantly and predicted student performance. The order of strength is as follows: (a) The school variable of DFG, (b) the student variable of Student Mobility, and (c) one of the 3. Teacher Variables of Percentage of Teachers with a Master's Degree in five of the six sections and Percentage of Teachers with a Doctorate Degree in one section (Proficient Math). It should be noted that the teacher variables had their greatest impact in the area of Language Arts.

The remaining independent variables were inconsistent predictors of student performance: *Student variables* - Student Suspension Rate was *statistically significant* four times and one additional time in *Model 1* of Advanced Proficient Language. Student Attendance Rate was *statistically significant* three times and one additional time in *Model 1* of Advanced Proficient Language. *School variables* - Library with Internet Access was *statistically significant* twice, as well as one additional time in *Model 2* in Partially Proficient Math. Class Size was *statistically significant* once, and Class with Internet Access was *statistically significant* once in *Model 2* of Advanced Proficient Math.

Four of the independent S*chool variables* - Total School Day in Minutes, Computer Lab with Internet Access, and All Internet Access, and *Teacher variable* - Faculty Attendance Rate, were never *statistically significant* in any regression model.

Conclusions

Based on the data; DFG, Student Mobility, and Teacher Educational Attainment in that order, are the three best predictors of student performance on the NJASK 4. As previously mentioned in Chapter III, the DFG reflects the socio economic status of the community, the higher the DFG the wealthier the community.

DFG

This finding is consistent with the body of literature in educational research including Coleman (1966) and Goldhaber (2002), identifies the socio economic status of students and/or the community as the strongest predictor of test scores. Unfortunately, student performance and wealth are inextricably linked. New Jersey, through the *Abbott v. Burke* decision has begun addressing the issue of educational outcome of students by increasing the level of funding in poor districts, in the hope of positively influencing student performance in those respective districts. However, this

study as well as the Coleman (1966) and the Goldhaber (2002) studies indicate many factors that influence student performance lie outside the school's purview. Notwithstanding, schools particularly in the lower DFG's, are increasing their efforts via home-school partnerships, PTA, curriculum expo, homework assignments that require parent participation, and family nights as examples, to begin educating and thereby transform the environment students return to. This is all done in the hope of increasing the learning opportunities of students, who otherwise typically would not have them and improving student performance.

Also, in recognition of the many factors outside of school that affect student performance, many districts in New Jersey in the lower end of DFG's provide students with after school programs designed to help remediate academic weaknesses, summer school to help address the academic needs of students who were not successful during the school year and now through monies made available through the No Child Left Act, providing Supplemental Educational Services (SES), in other words, tutoring services for students who are not achieving academic success evident by grades on the report card or standardized test scores. All these efforts and attempts support the notion that it takes significantly more money to educate students from low socio economic status than those from higher socio economic status.

These efforts in New Jersey, also occurring in other states such as California, Florida, Washington DC, Connecticut, and others, are implemented in order to help students from poor communities overcome the many obstacles and elements that interfere with their learning. Therefore, it is no coincidence that, many of the schools identified as "failing" in New Jersey, are located in the lower end of New Jersey's DFGs. It merely mirrors previous findings that indicate low socio economic status of a home and/or community generally negatively impacts student performance.

Student Mobility

The data from this study is also consistent with earlier research findings by Alexander, Entwisle, & Dauber (1996) that found student mobility during elementary school had a negative association with test scores. One attempt by New Jersey to help minimize the impact of student mobility reflecting negatively on school scores is the added feature in NJASK 4 test booklets that require schools to identify students who have been in the school or district for less than a year (by rule, those who registered after June 30th of that school calendar year). This is done for the purpose of removing individual student scores from the general school scores and thereby, not negatively impacting the overall performance of the school. This should help capture a more accurate picture of

school performance as oppose to previous years where schools were held accountable for students who may have enrolled in their school, perhaps a month prior to the administration of New Jersey's standardized testing program, and negatively impacting the overall school performance. The schools that will benefit most from this feature will be schools located in the less affluent DFGs, because the lower the DFG, the higher the student mobility rate in those schools are. Based on the findings from this research, schools with higher student mobility rate have fewer students performing at the Proficient and Advanced Proficient level.

Teacher Variables

In regards to teacher variables' impact on student performance, the study's findings are consistent with other studies that found a positive correlation between teachers' educational attainment and student performance (e.g., Andrew & Schwab, 1995, and Denton &Lacina, 1984, and Denton &Peters 1988). In addition, it supports No Child Left Behind's premise that teachers having a general master's degree can help students learn. Based on the assumption, teachers with more general knowledge can better respond to students' questions and create more learning opportunities, hence, improve student performance.

Counter to previous research on instructional time by Walberg (1988), based on the data, there is no evidence students who attended schools with longer school days (445 minuets) performed better on the NJASK 4 than students who attended schools with shorter school days (335 minutes). This translates to 1 hour and 40 minutes of additional time each day in school. Over the course of a traditional school year (180 days), this results in 300 hours or slightly over 40 days of additional time in school. However, this additional time in school may not reflect instructional time, the time teachers are actively teaching or time-on-task, usually defined as engaged time on a particular learning task(s). The inherent limits in the database for this study do not allow the researcher to determine the quality of instruction occurring in the various schools.

Other Variables

Since the majority of research on class size focuses on grades K-3, the findings from this study does not counter the findings from the significant number of studies, (i.e., Jepsen and Rivkin 2002, & Tennessee STAR 1999, & U.S. Department of Education 1998), that indicates the positive correlation between smaller class size and student test scores.

The limited impact of Schools Variables related to Internet access speaks to the complexity of assessing the effect of technology, specifically the Internet on test scores. Greater access to the Internet does not mean great use. Moreover, given the range of the quality of educational websites, it is difficult to determine what websites students are accessing on the Internet that is related to the skills they will need to demonstrate on the NJASK 4 test. Perhaps the Internet is better viewed as a teaching tool in positively impacting student test scores much like any other educational tool that has the potential to improve learning.

Lastly, because the teacher variable-Faculty Attendance Rate average was approximately 96%, it perhaps was not low enough to have an adverse affect on students' NJASK 4 scores.

Recommendations for Practice and Policy

A good plan is like a road map: it shows the final destination and usually the best way to get there. - H. Stanley Judd. Given the results from the data, the three strongest predictors of how students will perform on the NJASK 4 are DFG, followed by Student Mobility, then Percentage of Teachers with Master's Degree; and of those three, public schools can only influence one of them, the teacher variable. Public schools have little, if any, control on the socio economic status of the communities they

serve. Furthermore, they have little, if any, control on student mobility. In fact, based on this study's data, families who move most frequently are those who live in the less affluent District Factoring Groups.

The one variable, and in the opinion of the researcher, the most important variable, is the teacher variable. It has been the observation of the researcher that teachers who pursue a master's degree that appear unrelated to the classroom such as a master's in administration, through course work, become cognizant, if they were not already, of the various influences on student performance, as well as, through the traditional study of clinical supervision, the elements of good teaching.

Based on the findings, the researcher suggests that some percentage of the extraordinary funding that school districts have earmarked for technology be reallocated to fund further training of teachers in areas of pedagogy, content, student learning style, and instructional best practices found in colleges and universities' master's programs. The immediate reaction of those in the educational community is most likely to be opposition, for a number of reasons, including cost. Many would also assume that such a policy, encouraging teachers to pursue a master's degree or even a doctorate degree, would result in the unintended consequence of training teachers, who as a result of their training,

having become more effective in improving student performance, to leave the classroom. However, the researcher recommends the following two provisions to discourage such outcomes: (a) New Jersey's Department of Education, similar to New York and Pennsylvania's Departments of Education, implement by code, the requirement that teachers obtain a master's degree within 7 years of initial employment. (b) Districts will be encouraged by the state department of education to reimburse teachers the cost of a master's program on the condition that the teacher remains in the classroom 2 to 3 years after completion of the program. Failure to do so will result in the teacher reimbursing the school district at cost upon resignation.

In the study by Ball, and Darling-Hammond (1997) they indicate "Teachers who have spent more time studying teaching are more effective overall, and strikingly so for developing higher-order thinking skills and for meeting the needs of diverse students." (p. 3) Therefore, to better encourage teachers to pursue a master's degree in a content area or pedagogical area as opposed to administration, the researcher recommends school districts develop pay scales that reflect this desire. A distinction in the pay scale can be made as a result of each district's collective bargaining agreement in which the teacher who obtains a master's degree in Math, Science, or Reading is compensated at a higher rate than the

teacher who obtains a master's in administration. This arrangement in pay scale would better reflect the value of the local school districts desire to see teachers gain the teaching skills specific to their profession to better improve student achievement. Teachers who have already obtained a master's degree as part of a college or university 5-year master's in teaching/education program will obviously have satisfied the requirement of the department's code.

In the intervening time, the researcher suggests educational leaders, particularly principals, assign or reassign teachers who already possess a master's degree to teach 3rd and 4th grade, the grades which students are currently being assessed in the state of New Jersey. To help districts in the lower end of socio economic status/DFG overcome the negative effects associated with poverty, the state would reallocate funding to those districts whose students are under performing on the NJASK 4 to specifically go into teacher salary to better recruit teachers who have demonstrated effective teaching practices resulting in higher performance of students on standardized test and/or teachers who possess a master's degree. Although the suggested policy would result, over a period of time, that all teachers in the state of New Jersey would possess a master's degree. It should be implemented in combination with other effective strategies that improve student

performance such as class size reduction from K-3. In addition to the above policies, some recognition by politicians and policy makers that the negative effects of low socio economic status, evident in low student achievement are generally *not created by schools*, but are evident by the time these students arrive in kindergarten would greatly assist them in developing effective and sustainable policies that benefit students.

It is the researcher's opinion that the results from the recommended policies will be similar to what North Carolina is currently experiencing in their public schools; improved student achievement, better performance of their students on the National Assessment of Educational Progress (NAEP) test, particularly in relationship to other states. North Carolina has produced one of the largest achievement gains in mathematics and reading of any state in the nation. In the 1990's North Carolina's 4th grade students ranked near the bottom in state rankings on the NAEP, now 4th grade students are scoring above the national average.

Recommendations for Future Research

Recommendations for future research in the area of teacher variables involves adding a component to the information New Jersey's department of education requests from school districts. If schools in New Jersey were required to include the educational

attainment of teachers, correspondent to the grade level in which students are assessed, it would allow future researchers to compare the effect on student performance of teachers with master's or doctorate degrees to teachers with bachelor's degrees. Another consideration is to include information regarding the path by which teachers who teach in those respective grade levels acquired their certification, e.g. alternate route vs. traditional route.

Another recommendation for future research involves identifying schools whose 4th grade students are out performing other 4th grade students in the same DFG with similar school characteristics such as student mobility. Once identified, observing the teachers of the schools who are high performing as well as the teachers in the other schools who are not performing l to determine if there are any measurable differences in the delivery of instruction i.e., use of open-ended questioning, cooperative learning, use of diagrams, and other documented instructional best practice known to improve student learning and performance. Future researchers should also include as part of their research, the identification of resources, (i.e., textbooks, supplemental programs, supplemental materials, professional development etc…) to determine if there is a difference in resources available and/or training of teachers in the different schools.

As a final point, given the New Jersey Department of Education's possession of rich and valuable data and this study's' findings, it should perhaps consider allocating funds to support research of this kind and to establish the validity of this study's findings.

Caveats

A single empirical study of this kind cannot provide every answer, just some potential answers, to the complex overarching question of what is the best means to educating New Jersey's students. This study utilized data from New Jersey School Report Cards and therefore, *can not* hope to capture all of the characteristics of a school environment that might influence student learning. Nonetheless, given the largeness of the sample and the statistical treatment applied, Multiple Regression using SPSS, the results of this study are generalizable and worth consideration when policies are being developed and implemented. In addition, the results from this study indicating after DFG and Student Mobility, the teacher variable Percentage of Teachers with a Master's Degree was the best predictor of student performance on the NJASK 4 is consistent with recent related research indicating the enormous impact of the teachers on student learning.

*References marked with an asterisk indicate studies included in the meta-analysis

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